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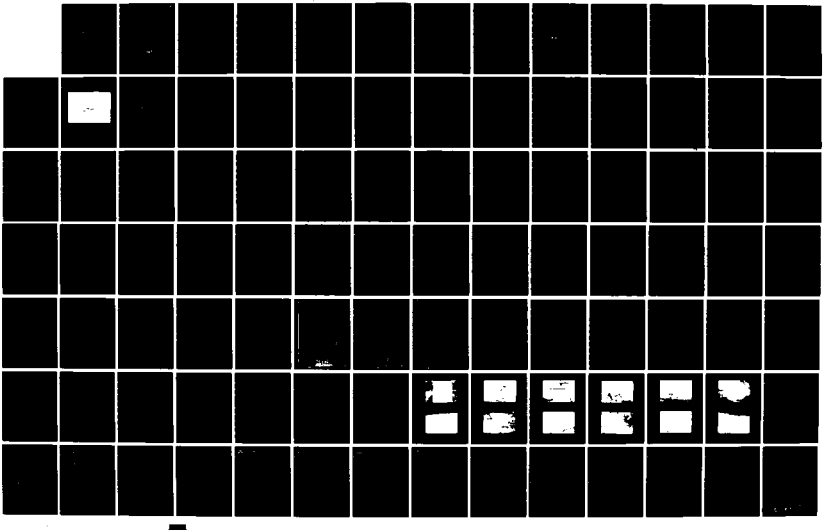

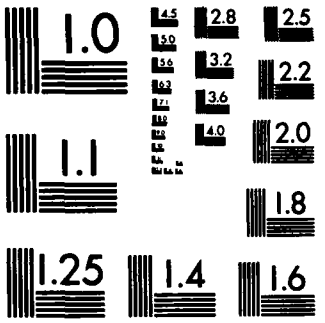

THAMES RIVER BASIN
STAFFORD, CONNECTICUT

ELLIS DAM
CT 00478

PHASE I INSPECTION REPORT
NATIONAL DAM INSPECTION REPORT

DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
WALTHAM, MASS. 02154

UNCLASSIFIED

SECURITY CLASSIFICATION OF THIS PAGE (When Data Entered)

REPORT DOCUMENTATION PAGE		READ INSTRUCTIONS BEFORE COMPLETING FORM
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19. KEY WORDS (Continue on reverse side if necessary and identify by block number)

DAMS, INSPECTION, DAM SAFETY,
Thames River Basin
Stafford, Connecticut

20 ABSTRACT (Continue on reverse side if necessary and identify by block number)

Ellis Dam consists of a 490 foot long earth embankment and a 150 foot wide grassed emergency spillway. Maximum height of dam is 40 feet with a maximum storage capacity of 824 acre-feet at crest elevation. Therefore, the size classification is intermediate. Hazard classification for Ellis Dam is HIGH. Corps of Engineers Guidelines recommend a test flood of PMF.

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DEPARTMENT OF THE ARMY
NEW ENGLAND DIVISION, CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASSACHUSETTS 02254

REPLY TO
ATTENTION OF:
NEDED

AUG 31 1981

Honorable William A. O'Neill
Governor of the State of Connecticut
State Capitol
Hartford, Connecticut 06115

Dear Governor O'Neill:

Inclosed is a copy of the Ellis Dam (CT-00478) Phase I Inspection Report, prepared under the National Program for Inspection of Non-Federal Dams. This report is based upon a visual inspection, a review of the past performance and a brief hydrological study of the dam. I approve the report and support the findings and recommendations described in Section 7 and ask that you keep me informed of the actions taken to implement them. This follow-up action is vitally important.

Copies of this report have been forwarded to the Department of Environmental Protection, and to the owner, State of Connecticut, Department of Environmental Protection. Copies will be available to the public in thirty days.

I wish to thank you and the Department of Environmental Protection for your cooperation in this program.

Sincerely,

C. E. EDGAR, III
Colonel, Corps of Engineers
Commander and Division Engineer

Incl
As stated

THAMES RIVER BASIN

STAFFORD, CONNECTICUT

ELLIS DAM

CT 00478

PHASE I INSPECTION REPORT

NATIONAL DAM INSPECTION PROGRAM

NATIONAL DAM INSPECTION PROGRAM

PHASE I INSPECTION REPORT

Identification No:	CT 00478
Name of Dam:	Ellis Dam
Town:	Stafford
County and State:	Tolland, CT
Stream:	Ellis Brook
Date of Inspection:	29 December, 1980

BRIEF ASSESSMENT

Ellis Dam consists of a 490 foot long earth embankment and a 150 foot wide grassed emergency spillway. The outlet consists of a concrete riser with 6 foot long weirs on each side and a 24-inch reinforced concrete outlet pipe discharging to Ellis Brook at the toe of dam.

Construction of this dam was completed in 1960 for the Connecticut Department of Agriculture and National Resources (now the Department of Environmental Protection). The dam was constructed for the purpose of flood control.

Maximum height of dam is 40 feet with a maximum storage capacity of 824 acre-feet at crest elevation. Therefore, the size classification is intermediate. The area of possible dam failure impact encompasses parts of a

private swim club including areas where camp trailers are parked during the summer season. Hazard classification for Ellis Dam is HIGH.

Corps of Engineers Guidelines recommend a test flood of Probable Maximum Flood (PMF). Probable maximum rainfall in this area is 24 inches in 6 hours. Based on Corps of Engineers Charts, the PMF results in a peak flow of 3550 cfs. Soil Conservation Service design for this dam used a rainfall of 15 inches and a runoff of 13.5 inches for the emergency spillway design. This design flood results in a peak inflow of 4985 cfs and a peak outflow of 2396 cfs with a maximum water surface elevation 2.0 feet below the crest of dam, which was used as the test flood.

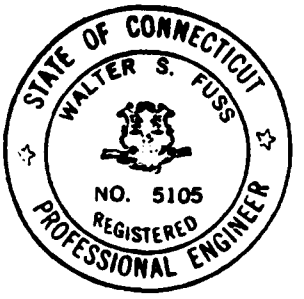
Based on the visual inspection, Ellis Dam appears to be in good condition. There was some deterioration of the concrete on the top of the principal spillway riser, but repairs had been made. Also, there was some settlement in what appears to be a spoil area used during construction. The plans show a slide gate at the inlet to the principal spillway but only some of the fittings are in place. Maintenance practices at Ellis Dam appear to be good.

It is recommended that the owner accomplish the following: continue present maintenance practices; fill holes in spoil area; prepare and implement a downstream warning system in case of an emergency; place riprap at the outlet from the principal spillway.

Recommendations and remedial measures listed above and detailed in Section 7 should be implemented by the Owner within two years after receipt of this Phase I Inspection Report.

FUSS & O'NEILL, INC.

BY: _____
Walter S. Fuss, P.E.
President



This Phase I Inspection Report on Ellis Dam (CT-00478) has been reviewed by the undersigned Review Board members. In our opinion, the reported findings, conclusions, and recommendations are consistent with the Recommended Guidelines for Safety Inspection of Dams, and with good engineering judgement and practice, and is hereby submitted for approval.

JOSEPH W. FINEGAN, JR., MEMBER
Water Control Branch
Engineering Division

ARAMAST MAHTESIAN, MEMBER
Geotechmical Engineering Branch
Engineering Division

CARNEY M. TERZIAN, CHAIRMAN
Design Branch
Engineering Division

APPROVAL RECOMMENDED:

JOE B. FRYAR
Chief, Engineering Division

PREFACE

This report is prepared under guidance contained in the Recommended Guidelines for Safety Inspection of Dams, for Phase I investigations. Copies of these guidelines may be obtained from the Office of Chief of Engineers, Washington, D.C. 20314. The purpose of a Phase I Investigation is to identify expeditiously those dams which may pose hazards to human life or property. The assessment of the general condition of the dam is based upon available data and visual inspections. Detailed investigation, and analyses involving topographic mapping, subsurface investigations, testing, and detailed computational evaluations are beyond the scope of a Phase I investigation: however, the investigation is intended to identify any need for such studies.

In reviewing this report, it should be realized that the reported condition of the dam is based on observations of field conditions at the time of inspection along with data available to the inspection team. In cases where the reservoir was lowered or drained prior to inspection, such action, while improving the stability and safety of the dam, removes the normal load on the structure and may obscure certain conditions which might otherwise be detectable if inspected under the normal operating environment of the structure.

It is important to note that the condition of a dam depends on numerous and constantly changing internal and external conditions, and is evolutionary in nature. It would be incorrect to assume that the present condition

of the dam will continue to represent the condition of the dam at some point in the future. Only through continued care and inspection can there be any chance that unsafe conditions be detected.

Phase I inspections are not intended to provide detailed hydrologic and hydraulic analyses. In accordance with the established Guidelines, the Spillway Test flood is based on the estimated "Probable Maximum Flood" for the region (greatest resonably possible storm runoff), or fractions thereof. Because of the magnitude and rarity of such a storm event, a finding that a spillway will not pass the test flood should not be interpreted as necessarily posing a highly inadequate condition. The test flood provides a measure of relative spillway capacity and serves as an aide in determining the need for more detailed hydrologic and hydraulic studies, considering the size of the dam, its general condition and the downstream damage potential.

The Phase I Investigation does not include an assessment of the need for fences, gates, no-trespassing signs, repairs to existing fences and railings and other items which may be needed to minimize trespass and provide greater security for the facility and safety to the public. An evaluation of the project for compliance with OSHA rules and regulations is also excluded.

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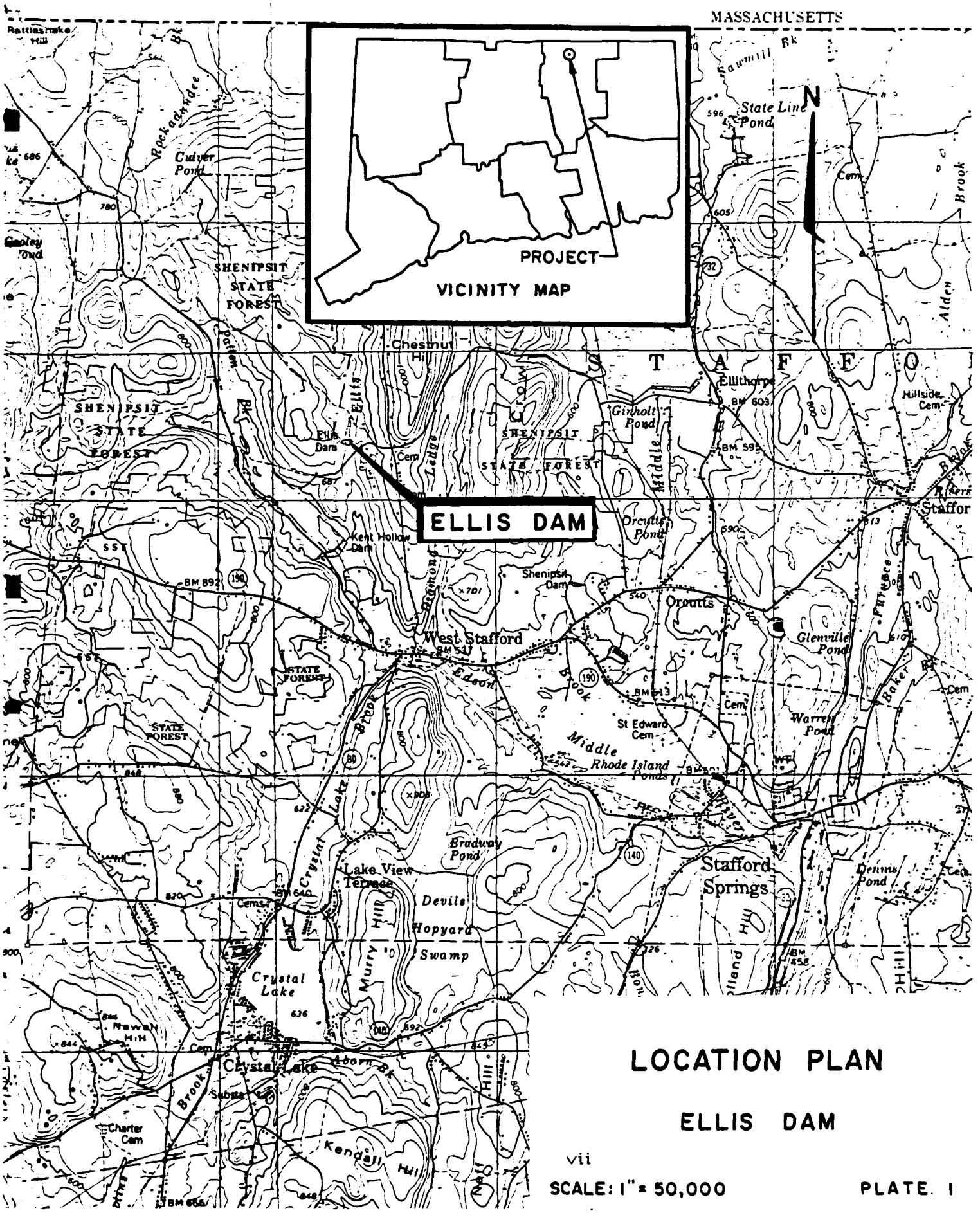

LOCATION PLAN

ELLIS DAM

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SCALE: 1" = 50,000

PLATE 1

NATIONAL DAM INSPECTION PROGRAM
PHASE I INSPECTION REPORT
ELLIS DAM CT 00478

SECTION 1 - PROJECT INFORMATION

1.1 GENERAL:

a. Authority. Public Law 92-367, August 8, 1972, aurhorized the Secretary of the Army, through the Corps of Engineers, to initiate a national program of dam inspection through the United States. The New England Division of the Corps of Engineers has been assigned the responsibility of supervising the inspection of dams within the New England Region. Fuss & O'Neill, Inc. has been retained by the New England Division to inspect and report on selected dams in the State of Connecticut. Authorization and notice to proceed was issued to Fuss & O'Neill, Inc. under a letter of 25 November, 1980 from William E. Hodgson, Jr., Colonel, Corps of Engineers. Contract No. DACW33-81-C-0020 has been assigned by the Corps of Engineers for this work.

b. Purpose.

1. Perform technical inspection and evaluation of non-federal dams to identify conditions which threaten the public safety and thus permit correction in a timely manner by non-federal interests.
2. Encourage and assist the States to initiate quickly effective dam safety programs for non-federal dams.
3. To update, verify and complete the National Inventory of Dams.

1.2 DESCRIPTION OF THE PROJECT:

a. Location. Ellis Dam is located in the Town of Stafford, County of Tolland, State of Connecticut. The dam is located at Latitude 41°-59'-28" and Longitude 72°-21'-54". Ellis Dam impounds flow in Ellis Brook, with a 1.5 square mile watershed. About 0.9 miles downstream of the dam, Ellis Brook joins Patten Brook which joins Edson Brook approximately 0.7 miles further downstream. 1.6 miles below this point, Edson Brook flows into Middle River which joins with Furnace Brook to form the Willimantic River 5.7 miles below Ellis Dam. The dam is located about 500 feet north of Tetrault Road and 1,500 feet west of Kemp Road. This structure is for flood control and, except during storms, the pool is dry. The detention pool runs in a northerly direction from the dam.

b. Description of Dam and Appurtenances. Ellis dam is about 490 feet in length with a top width of 14 feet. The structure is a homogeneous earth embankment using local borrow material with a maximum height of 40 feet. Upstream slopes are 1.0 vertical to 3.0 horizontal and downstream slopes are 1.0 vertical to 2.0 horizontal. Top of dam elevation is 713.0.

The emergency spillway is grassed lined with a crest 5.2 feet below the top of dam (elevation 707.8). Spillway bottom width is 150

feet with side slopes of 1.0 vertical to 3.0 horizontal and is located at the east end of the dam. The 240 foot approach to the emergency spillway slopes up at 2.0% followed by a 30 foot level area and a 250 foot discharge section sloping down at 2.7%.

The principal spillway consists of a reinforced concrete riser with 6.0 foot weirs on each side, parallel to the stream flow and at elevation 683.0. There is an 18 inch opening in the upstream face of the riser with the invert at the bottom of the approach channel at elevation 678.0. Plans included a slide gate at this opening, but the gate was not installed. A 24-inch reinforced concrete water pipe 201 feet long with invert elevation 678.0 discharges from the riser to the natural channel of Ellis Brook.

The dam embankment spans the natural stream valley with the emergency spillway cut into natural ground.

c. Size Classification. Height of dam is 40 feet from crest of dam to bed of outlet channel and the total storage volume is 824 acre-feet. The dam is therefore classified as an INTERMEDIATE structure in accordance with the recommended guidelines of the Corps of Engineers. Intermediate structures are those with heights from 40 to 99 feet and/or storage volumes from 1000 to 50,000 acre-feet.

d. Hazard Classification. Ellis Dam is classified as having a HIGH hazard potential because it is located in a rural area about 4,500 feet upstream of a private swim club with camping facilities. A failure discharge would cause the loss of more than a few lives at the camping area.

Estimated water depth due to the possible dam failure discharge of 55,100 cfs. may range from 13.3 feet just below the dam to 22.3 feet 1,000 feet downstream, with a depth dropping to 8.5 feet about 7,000 feet downstream of the dam. In the camping area, water depths before failure range from 4.1 feet to 6.3 feet. After failure, depths range from 9.9 feet to 13.4 feet.

e. Ownership. Ellis Dam is owned by the State of Connecticut and is maintained by the Department of Environmental Protection.

f. Operator. Operating personnel are under the direction of:

John Spencer
Region 3 Director
Department of Environmental Protection
Marlborough, CT 06447
Telephone: (203) 295-9523

g. Purpose of Dam. Ellis Dam is a flood control dam to reduce damage in Stafford Springs due to flooding from Furnace Brook and Middle River. Since this is essentially a dry dam, flood control is the only present use.

h. Design and Construction History. Construction of this facility was completed in 1960. The dam was designed by the U.S. Department of Agriculture, Soil Conservation Service for the Connecticut Department of Agriculture and Natural Resources.

i. Normal Operating Procedure. This facility is dry except during periods of storm flow. Water enters the outlet structure by passing over fixed weirs in the principal spillway riser. Therefore, operation is automatic.

1.3 PERTINENT DATA:

a. Drainage Area. Ellis Dam is located in Tolland County in northeastern Connecticut with a drainage basin that is generally rectangular in shape with a length of about 1.7 miles, a width of about 0.9 miles and a total area of 1.5 square miles. The area is rolling with elevations from 700 to 1,060 feet and is rural. There is no significant storage areas to dampen the flows.

b. Discharge of Dam Site. There is no history of discharge data available for this dam. Listed below are calculated discharge data for the ungated principal spillway and the ungated emergency spillway. There are no outlet works or gated spillways.

b. Discharge of Dam Site (Continued)

1.	Outlet Works	N/A
2.	Maximum known flood at dam site	Unknown
3.	Ungated spillway capacity at top of dam elevation 713.0	
	a. Principal Spillway	75 cfs.
	b. Emergency Spillway	5,290 cfs.
4.	Ungated spillway capacity at test flood elevation 711.0	
	a. Principal Spillway	75 cfs.
	b. Emergency Spillway	2,320 cfs.
5.	Gated spillway at normal pool elevation	N/A
6.	Gated spillway at test flood elevation	N/A
7.	Total spillway capacity at test flood elevation 711.0	2,395 cfs.
8.	Total project discharge at top of dam elevation 713.0	5,365 cfs.
9.	Total project discharge at test flood elevation 711.0	2,395 cfs.

c. Elevation. (feet above N.G.V.D.)

1.	Streambed at toe of dam	673.0
2.	Bottom of cutoff	N/A
3.	Maximum Tailwater	Unknown
4.	Normal Pool	N/A

c. Elevation (continued)

5.	Full flood control pool	707.8
6.	Emergency spillway crest	707.8
7.	Design surcharge	711.0
8.	Top of Dam	713.0
9.	Test flood surcharge	711.0

d. Reservoir. (Length in feet)

1.	Normal pool	None
2.	Flood control pool	3,000 ft.
3.	Emergency spillway crest pool	3,000 ft.
4.	Top of dam pool	3,160 ft.
5.	Test Flood Pool	3,100 ft.

e. Storage. (acre-feet)

1.	Normal pool	None
2.	Flood control pool	560
3.	Emergency spillway crest pool	560
4.	Top of dam pool	824
5.	Test flood pool	716

f. Reservoir Surface (acres)

1.	Normal pool	None
2.	Flood control pool	46
3.	Emergency spillway crest pool	46

f.	Reservoir Surface (continued)	
	4. Test flood pool	52
	5. Top of Dam	56
g.	Dam.	
	1. Type	Earth Embankment
	2. Length	490 ft.
	3. Height	40 ft.
	4. Top Width	14 ft.
	5. Side Slopes	Upstream 3H:1V Downstream 2H:1V
	6. Zoning	None
	7. Impervious Core	None
	8. Cutoff	None
	9. Grout curtain	None
h.	Diversion and Regulatory Tunnel.	N/A
i.	Spillway.	
	Principal Spillway	
	1. Type	Concrete riser with side weirs
	2. Length of weir	2 @ 6.0' = 12'
	3. Crest elevation	683.0
	4. Gates	None

i. Spillway (continued)

5.	U/S Channel	Natural Bed
6.	D/S Channel	Natural Bed
7.	Design Surcharge	711.0

Emergency Spillway

1.	Type	Grass with 3H:1V side slopes
2.	Length of Weir	150' bottom width
3.	Crest elevation	707.8
4.	Gates	None
5.	U/S Channel	Grass
6.	D/S Channel	Grass
7.	Design Surcharge	711.0

j. Regulating Outlet.

1.	Invert	678.0
2.	Size	24" pipe out and 18" opening in
3.	Description	Pipe from bottom of spillway riser
4.	Control Mechanism	None
5.	Other	None

SECTION 2 - ENGINEERING DATA

2.1 DESIGN DATA:

Ellis Dam was designed by the United State Department of Agriculture, Soil Conservation Service for the Connecticut Department of Agriculture and Natural Resources. The following Design Data was used in the design of this dam:

Drainage Area	1.52 square miles
Design Storm	15" in 6 hours
Total Precipitation Loss	1.5"
Net Runoff	13.5"
Design Peak Flow	4,985 cfs.
Per Square Mile	3,270 cfs.
Drawdown Time	4.92 days
Maximum Discharge	2,396 cfs.
Emergency Spillway Construction	Earth Channel
Emergency Spillway Discharge	2,322 cfs.
Emergency Spillway Width	150' (bottom)
Dc at Control Section	1.72'
Vc at Control Section	7.4 fps
Max V in Emergency Spillway	8.0 fps
Freeboard	2.0'

2.2 CONSTRUCTION DATA:

An application For Construction Permit For Dam dated May 15, 1959 was submitted to the State. The Construction Permit was approved on May 22, 1959 by the Connecticut Water Resources Commission. Construction was completed in 1960. A final inspection was held on August 25, 1960 by the Consultant to Water Resources Commission. Another inspection was made on October 20, 1961 of the results of the seeding operation which was not complete at the time of the first

inspection. A Certificate of Approval was issued November 9, 1961.

2.3 OPERATION DATA:

Since this is basically a dry pool flood control dam with no recording instrumentation, there are no operation records available.

2.4 EVALUATION OF DATA:

a. Availability. The Connecticut Department of Environmental Protection made their files available with limited design and construction information. Also, the Work Plan and Design Report was examined at the State Office of the Soil Conservation Service. Actual computations have been stored in the National Archives of the Soil Conservation Service and are not easily available.

b. Adequacy. The lack of in-depth engineering data did not allow for a definitive review. Therefore, the adequacy of this dam could not be assessed from the standpoint of reviewing design and construction data, but is based primarily on visual inspection with an empty pool, limited past performance and sound engineering judgment.

c. Validity: The field inspection indicated that the dam was constructed substantially as shown on the As-Built Plans.

SECTION 3 - VISUAL INSPECTION

3.1 FINDINGS:

a. General. Based on the visual inspection and a review of the design criteria and construction plans, Ellis Dam and its appurtenances are judged to be in good condition. At the time of the inspection, the dam was essentially dry.

The dam consists of an earth embankment with underlying soils consisting of Sutton, Gloucester and Leicester-Ridgebury-Whitman soils. The dam was constructed in conjunction with five other dams in the area for the purpose of flood control in the Borough of Stafford Springs and is a dry dam.

b. Dam.

1. Upstream Face - The upstream face is grass covered with a very dense mat on most of the surface. There are no trees growing on this slope which is shown in Photo No. C-2.

2. Crest - The crest is grass covered (sparse in some areas) and can be seen in Photo No. C-2. It is relatively level with vehicle tracks, but no significant rutting.

3. Downstream Face - The downstream face is grass covered with a very dense mat and is shown in Photo No. C-6. Trespassing on the slopes is insignificant. There was no apparent

seepage from the downstream slope, sloughing of the slopes or erosion. There is no apparent trespassing on the slopes by vehicles.

The slope running south from the dam and along the west edge of the emergency spillway appears to have been used as a spoil area during construction. This embankment is entirely on natural ground and is not a structural part of the dam. There are eight to ten small isolated settled areas as would occur where boulders or clearing debris were nested in the fill. These settled areas are shown in Photos No. C-10 and C-11 and are generally about two feet in diameter and one foot deep.

Foundation drains appear to be functioning with minor flow at the time of the inspection. An outlet to a foundation drain is shown in Photo No. C-8. The estimated flow from each of two drains at the time of the inspection is 4 gallons per minute.

c. Appurtenant Structures.

1. Principal Spillway - The inlet to the principal spillway is shown in Photo No. C-4 and C-5. Although the plans show an 18-inch slide gate at invert of the approach channel, only the frame was installed as shown in Photo No. C-4. As shown in Photo No. C-5, some patching has been done

on the concrete top slab on the riser. The patch appears to be tight and functioning. Other concrete and appurtenances appear to be in good condition.

There is a 24-inch concrete pipe from the riser through the embankment to the outlet. The portion of the pipe that is visible is in good condition and is shown in Photo No. C-7. The last pipe at the outlet is 16 feet in length and is supported at mid-point by a reinforced concrete bent 8 feet deep. The remainder of the outlet pipe is supported on a reinforced concrete collar. The outlet from the principal spillway is in good condition with no apparent erosion in the channel. Plans show five antiseep collars on 23 foot centers from the upstream face of dike to just beyond the centerline of dam. Collars are 7.5 feet high and 11.3 feet wide. A bent and cradle are not visible, but there are no outward signs of any problems.

2. Emergency Spillway - The emergency spillway is grass lined with a 150 foot bottom width and is shown in Photo No. C-12. There is a good mat of grass and the spillway is in good condition.

d. Reservoir Area. Except for the area in the immediate vicinity of the dam, the reservoir area is heavily wooded as shown in the overview photo and Photo No. C-3. The flood area is generally about 1,200 feet west of Kemp Road and is not near any roads or homes. No detrimental features in the reservoir area were observed.

e. Downstream Channel. The downstream channel for Ellis Dam is a natural stream called Ellis Brook as shown in Photo No. C-3. About 500 feet downstream, Ellis Brook crosses Tetrault Road. About 4,000 feet downstream, the brook enters the grounds of a private swim club and recreation area. It appears that camp trailers are parked in the area during the summer season.

3.2 EVALUATION:

Based on visual inspection, the overall condition of the dam is good and the maintenance program appears to be good. The following items require attention but prompt action is not required and the work can be accomplished during routine maintenance inspections.

a. Fill depressions in the apparent spoil area as shown in Photos C-10 and C-11. Although the depressions have no effect on the stability or function of the dam, they present a hazard to anyone walking in the area.

b. Monitor the patched areas on the principal spillway intake structure to insure that they stay sound.

c. Continue the existing routine maintenance program.

d. Since the reservoir was dry during the inspection, possible areas of seepage could not be observed. The downstream face should be inspected during periods when significant levels of water are in the reservoir.

e. Place riprap at the outlet of the principal spillway to prevent any possible erosion.

f. Monitor the seepage from the foundation drains during future technical inspections and conduct further investigation of increase in flow.

SECTION 4 - OPERATIONAL AND MAINTENANCE PROCEDURES

4.1 OPERATIONAL PROCEDURES:

a. General. This dam is a flood control structure and the operation is automatic in that the principal spillwy limits discharges and causes excess flow to be stored in the reservoir; when the inflow falls below the rate of discharge, the water level drops and eventually empties through the principal spillway.

b. Description of Any Warning System in Effect. There is no formal downstream warning system in case of emergency at the dam.

4.2 MAINTENANCE PROCEDURES:

a. General. This dam is checked for maintenance requirements two times per year by District Maintenance personnel and any required work is done at that time. Maintenance consists mainly of cutting grass and tree growth. Maintenance appears to be good at this dam.

b. Operating Facilities. There are no operating facilities at this dam.

4.3 EVALUATION:

The existing maintenance schedule should be continued. A downstream warning system should be developed and put into effect in case of emergency at the dam.

SECTION 5

EVALUATION OF HYDRAULIC/HYDROLOGIC FEATURES

5.1 GENERAL:

Ellis Dam consists of a 490 foot long earth dam with a maximum height of 40 feet. There is a principal spillway consisting of a reinforced concrete riser with a 24 inch concrete pipe outfall. The emergency spillway is a 150 foot wide grass spillway with a maximum surcharge of 5.2 feet before overtopping the dam.

Ellis Brook and two unnamed streams are impounded by this structure. The watershed is rolling and wooded. Except for swampy areas along Ellis Brook and 2 acre Bruie Pond at the upper end of the watershed, there are no significant storage areas in the watershed.

5.2 DESIGN DATA:

Ellis Dam was designed by the Soil Conservation Service. The weighted curve number for the watershed was computed to be 66.36 with a time of concentration of 1.3 hours.

The design flood used a rainfall of 15 inches in 6 hours with AMC III. A total precipitation loss of 1.5 inches resulted in a net runoff of 13.5 inches. Drawdown time was calculated to be 4.92 days.

The critical depth at the control section in the emergency spillway was calculated to be 1.72 feet and the maximum velocity to be 8.0 feet per second.

5.3 EXPERIENCE DATA:

No historical data for recorded discharges or water surface elevations are available for this dam or watershed.

5.4 TEST FLOOD ANALYSIS:

Recommended guidelines for the safety inspection of dams by the Corps of Engineers were used for the selection of the "Test Flood". Ellis Dam is classified as intermediate in size with a HIGH hazard potential. Guidelines for these classifications indicate that an event equal in magnitude to the Probable Maximum Flood should be used. The probable maximum rainfall for this area is 24 inches in 6 hours for 10 square miles. When designing the facility, the Soil Conservation Service used a 6-hour rainfall of 15 inches and a runoff of 13.5 inches.

The design flood was calculated by the SCS to be 4,985 cfs. which is 3,270 CSM. The peak outflow for the design flood inflow was computed to be 2,396 cfs. by the Soil Conservation Service. This outflow results in a water surface elevation 2.0 feet below the crest of dam with a

maximum depth of flow in the emergency spillway of 3.2 feet.

Using Corps of Engineers methods, the PMF was calculated to be 3,550 cfs. The SCS design flood of 4985 cfs. is used as the "Test Flood" for this report.

The capacity of spillways at the top of dam elevation is 5,366 cfs. which is 224 percent of the calculated test flood discharge.

5.5 DAM FAILURE ANALYSIS:

Applying the calculated dam failure discharge of 55,100 cfs. when the impounded water level in the reservoir is at elevation 711.0 (Test Flood Surcharge) will produce a flood depth of 13 feet and an approximate water surface elevation of 686.3 just downstream of the dam. At the peak discharge rate of 2,396 cfs. for the test flood, the approximate water surface elevation would be 676.5 just downstream of the dam. The depths of flow would range from 22.3 feet 1,000 feet downstream of the dam to 8.5 feet approximately 7,000 feet downstream.

From 4,000 to 6,000 feet downstream of the dam, a private swim club maintains several facilities including areas for camping vehicles. The following table shows the pre and post failure water elevations along with the increased depth of water due to the assumed failure in the area where campers could be located:

Station	Elev. Pre-Failure	Elev. Post-Failure	Difference
40+0	554.0	561.1	7.1'
50+0	545.3	552.4	7.1'
55+0	540.1	546.4	6.3'
60+0	538.3	544.3	6.0'

These increases in water elevations could cause the loss of more than a few lives which establishes the hazard classification as HIGH. Therefore, water depths at specific structures downstream of this area were not determined. Except for Tetrault Road located 500 feet downstream of dam, the area between the dam and the private swim club is wooded with no structures.

Computations of water surface elevations and a map showing the limits of the impact area are included in Appendix D.

SECTION 6

STRUCTURAL STABILITY

6.1 VISUAL OBSERVATION:

The field inspection did not reveal any stability problems.

6.2 DESIGN AND CONSTRUCTION DATA:

A review of the "As-Built" drawings did not disclose any potential stability problems. It appeared that the dam was constructed as shown on the drawings. The field inspection did not indicate any substantial variance from the plans other than the apparent spoil area which does not affect the structural stability of the dam.

6.3 POST CONSTRUCTION CHANGES:

There are no post construction changes apparent.

6.4 SEISMIC STABILITY:

Ellis Dam is located in Seismic Zone 1 and in accordance with the Corps of Engineers' guidelines does not warrant further seismic analysis at this time.

SECTION 7

ASSESSMENT, RECOMMENDATIONS AND REMEDIAL MEASURES

7.1 DAM ASSESSMENT:

a. Condition. Based on the visual inspection, Ellis Dam appears to be in good condition.

b. Adequacy of Information. "As-Built" drawings were made available for this report. The Work Plan and Design Report were available for examination at the Soil Conservation Service office. Actual design calculations were not available, but were reviewed by engineers for the Connecticut Water Resources Commission before construction was started.

c. Urgency. The recommendations presented in Sections 7.2 and 7.3 should be carried out within two years of receipt of this report by the Owner.

7.2 RECOMMENDATIONS:

There are no recommendations requiring additional engineering investigation or major modifications to the dam.

7.3 REMEDIAL MEASURES:

a. Operation and Maintenance Procedures. The following remedial measures should be implemented during routine maintenance trips

to the dam:

1. Fill holes in the spoil area and monitor for reoccurence.
2. Emergency procedures consisting of an operation plan and warning system for downstream residents should be developed and implemented.
3. Maintain a record of maximum water levels during flood events for future evaluation studies.
4. During flood events, check dam for evidence of seepage.
5. Institute a biennial inspection of the dam by technical personnel.
6. Place riprap at outlet of principal spillway.
7. Monitor seepage from foundation drains during future technical inspections.

7.4 ALTERNATIVES:

There are no alternatives to the recommendations and remedial measures contained in Sections 7.2 and 7.3.

APPENDIX A

INSPECTION CHECK LIST

VISUAL INSPECTION CHECK LIST
PARTY ORGANIZATION

PROJECT Ellis Dam DATE 12-29-80 & 2-19-81

TIME 1:00 p.m.

WEATHER Partly cloudy, 5" snow on ground

W.S.Elev. 678.0 U.S. 675.0 DN.S.

PARTY:

1. G. Mirtl, Hydrology & Hydraulics
2. C. Welti, Soils & Geology
3. E. Lang, Structural & Mechanical
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

PROJECT FEATURE	INSPECTED BY	REMARKS
1. All features inspected by all members of party.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
DIKE EMBANKMENT	
Crest Elevation	713.0
Current Pool Elevation	No Pool
Maximum Impoundment to Date	Unknown
Surface Cracks	None
Pavement Condition	No pavement, grass covered crest
Movement or Settlement of Crest	None apparent
Lateral Movement	None apparent
Vertical Alignment	Good
Horizontal Alignment	Good
Condition at Abutment and at Concrete Structures	Good
Indications of Movement of Structural Items on Slopes	Not applicable (N/A)

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
DIKE EMBANKMENT (cont)	
Trespassing on Slopes	Insignificant
Sloughing or Erosion of Slopes or Abutments	Insignificant
Rock Slope Protection - Riprap Failures	N/A
Unusual Movement or Cracking at or near Toes	None apparent
Unusual Embankment or Downstream Seepage	Water flowing from drains - moist at lower 3' at low point of dam. Insignificant affect on stability.
Piping or Boils	None apparent
Foundation Drainage Features	Appear functionable
Toe Drains	N/A
Instrumentation System	None
Vegetation	Good grass cover - no trees

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
SPOIL AREA	
Location	Downstream slope of dike embankment west of emergency spillway on original ground.
Condition	Several sink holes as would occur over nested boulders or clearing debris.

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - INTAKE CHANNEL AND INTAKE STRUCTURE	
a. Approach Channel	
Slope Conditions	Good
Bottom Conditions	Good
Rock Slides or Falls	None
Log Boom	None
Debris	None
Condition of Concrete Lining	N/A
Drains or Weep Holes	N/A
b. Intake Structure	
Condition of Concrete	Good
Stop Logs and Slots	Good

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - TRANSITION AND CONDUIT	Concrete pipe principal spillway outlet
General Condition of Concrete	Good
Rust or Staining on Concrete	None
Spalling	None
Erosion or Cavitation	None
Cracking	None
Alignment of Monoliths	N/A
Alignment of Joints	N/A
Numbering of Monoliths	N/A

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER	Not Applicable
a. Concrete and Structural	
General Condition	
Condition of Joints	
Spalling	
Visible Reinforcing	
Rusting or Staining of Concrete	
Any Seepage or Efflorescence	
Joint Alignment	
Unusual Seepage or Leaks in Gate Chamber	
Cracks	
Rusting or Corrosion of Steel	

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - CONTROL TOWER (cont)	Not Applicable
b. Mechanical and Electrical	
Air Vents	
Float Wells	
Crane Hoist	
Elevator	
Hydraulic System	
Service Gates	
Emergency Gates	
Lightning Protection System	
Emergency Power System	
Wiring and Lighting System	

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - OUTLET STRUCTURE AND OUTLET CHANNEL	
General Condition of Concrete	Concrete good. Some patches which appear good.
Rust or Staining	None
Spalling	None
Erosion or Cavitation	None
Visible Reinforcing	None
Any Seepage or Efflorescence	None
Condition at Joints	N/A
Drain Holes	N/A
Channel	Good
Loose Rock or Trees Overhanging Channel	None
Condition of Discharge Channel	Good

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	Emergency Spillway
a. Approach Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Approach Channel	Good
b. Weir and Training Walls	N/A
General Condition of Concrete	
Rust of Staining	
Spalling	
Any Visible Reinforcing	
Any Seepage or Efflorescence	

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SPILLWAY WEIR, APPROACH AND DISCHARGE CHANNELS	
b. Weir and Training Walls	N/A
Drain Holes	
c. Discharge Channel	
General Condition	Good
Loose Rock Overhanging Channel	None
Trees Overhanging Channel	None
Floor of Channel	Good
Other Obstructions	None

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE	Not Applicable
a. Super Structure	
Bearings	
Anchor Bolts	
Bridge Seat	
Longitudinal Members	
Under Side of Deck	
Secondary Bracing	
Deck	
Drainage System	
Railings	
Expansion Joints	
Paint	

PERIODIC INSPECTION CHECK LIST

PROJECT Ellis Dam DATE 12-29-80

PROJECT FEATURE _____ NAME _____

DISCIPLINE _____ NAME _____

AREA EVALUATED	CONDITION
OUTLET WORKS - SERVICE BRIDGE (cont)	Not Applicable
b. Abutment & Piers	
General Condition of Concrete	
Alignment of Abutment	
Approach to Bridge	
Condition of Seat & Backwall	

APPENDIX B

ENGINEERING DATA

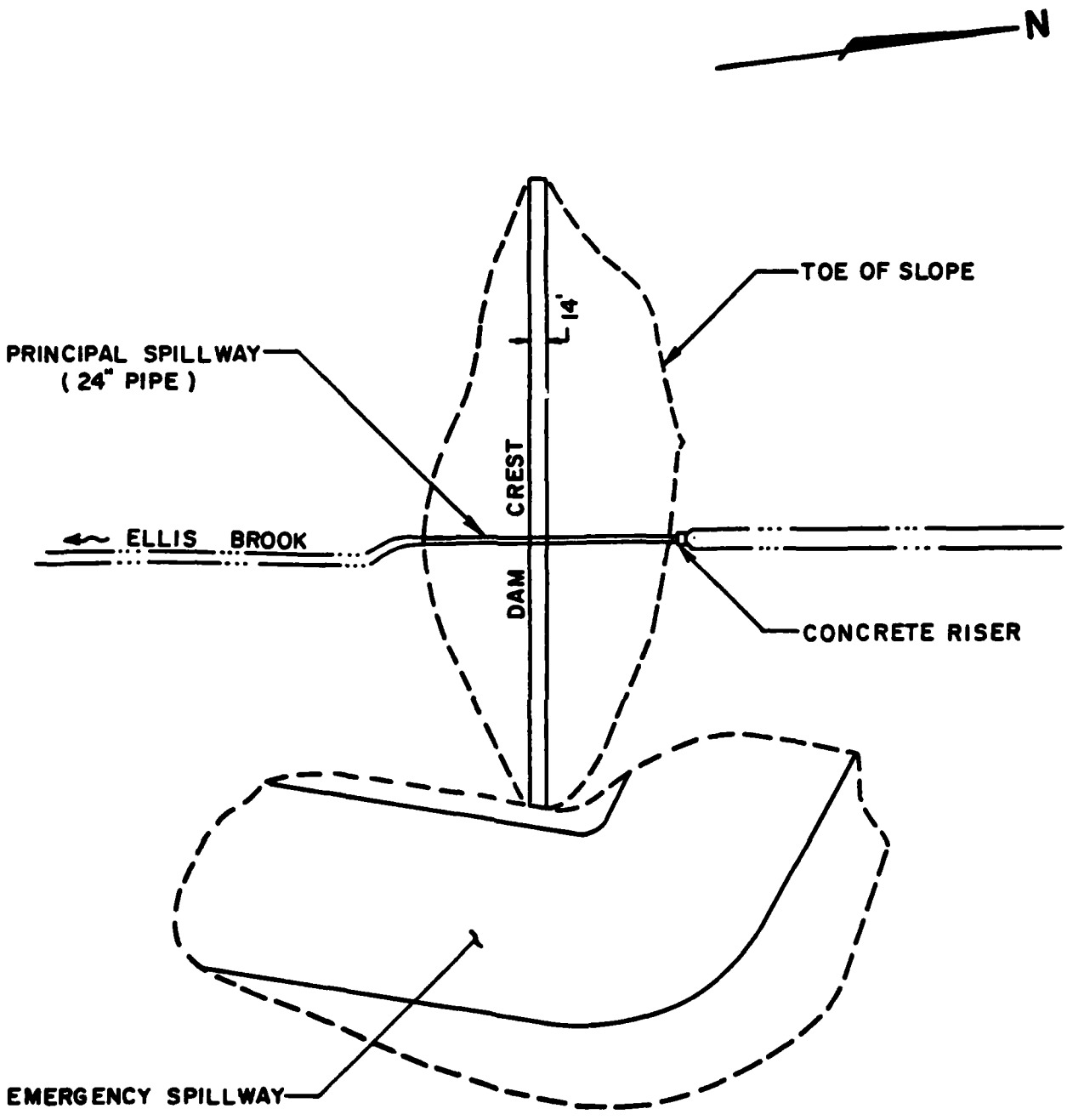
ENGINEERING DATA

1. As Built drawings and maintenance information are on file at:

   State of Connecticut
   Department of Environmental Protection
   State Office Building
   Hartford, CT 06114

2. Work Plan, Design Report and access to original calculations are available at:

   U.S. Department of Agriculture
   Soil Conservation Service
   Mansfield Professional Park
   Storrs, CT 06268

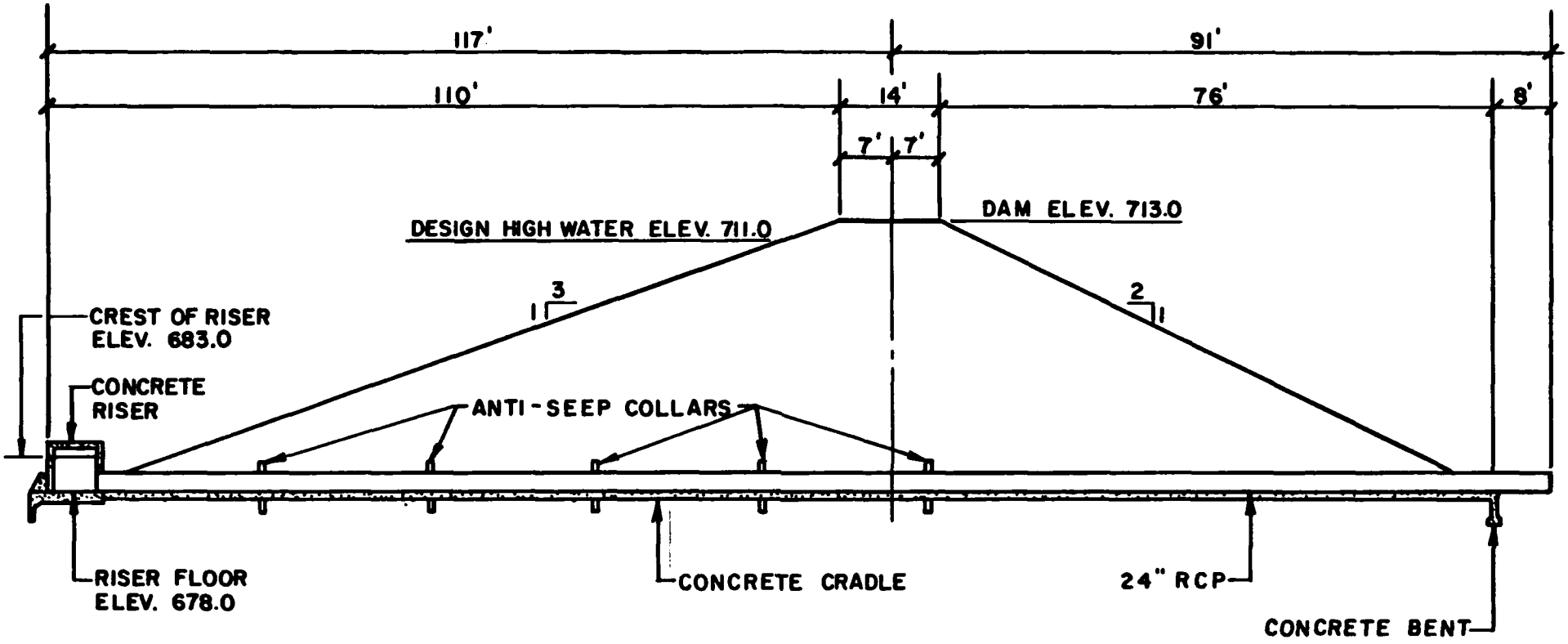


GENERAL PLAN

SCALE: 1"=120'±

ELLIS DAM

PLATE B-1

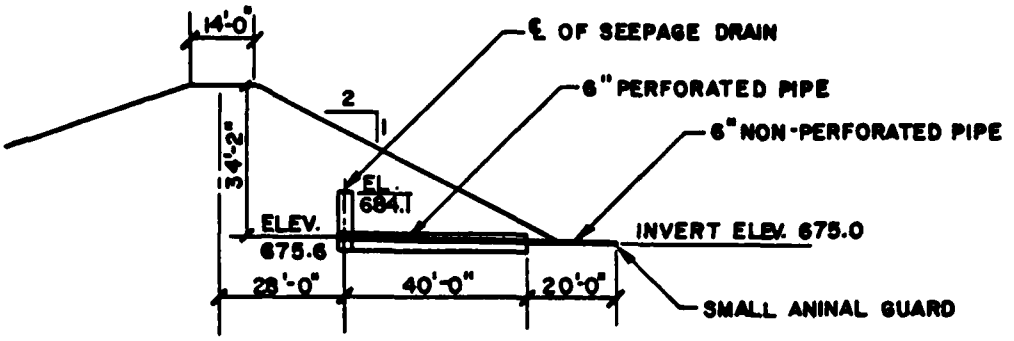


PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY

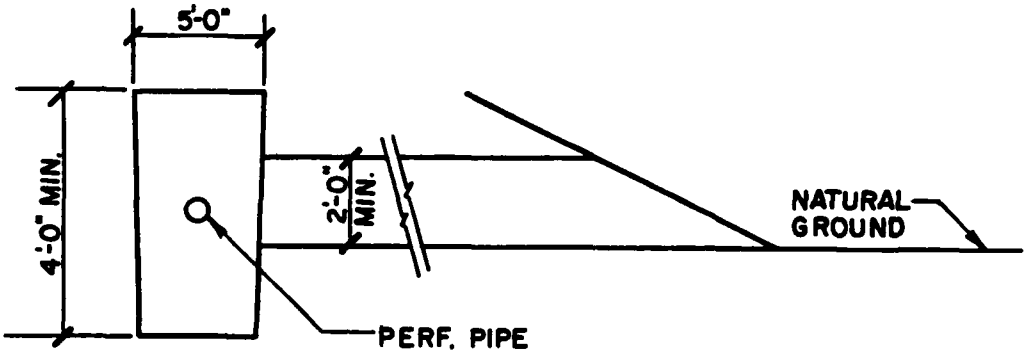
SCALE: 1"=20'±

PLATE B-2

ELLIS DAM

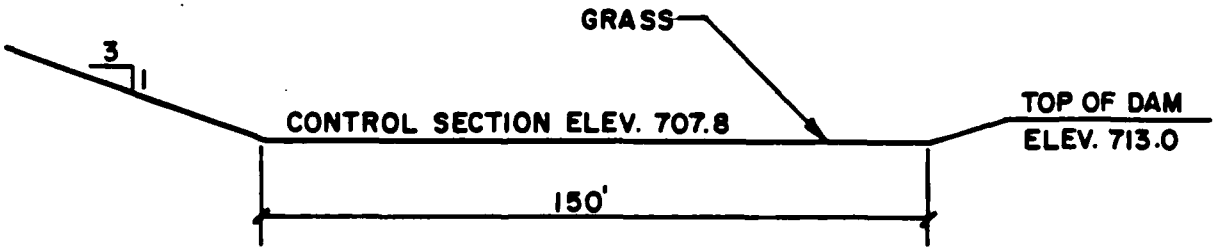


SECTION THRU ℄ OUTLET PIPE



SEEPAGE DRAIN

NOT TO SCALE

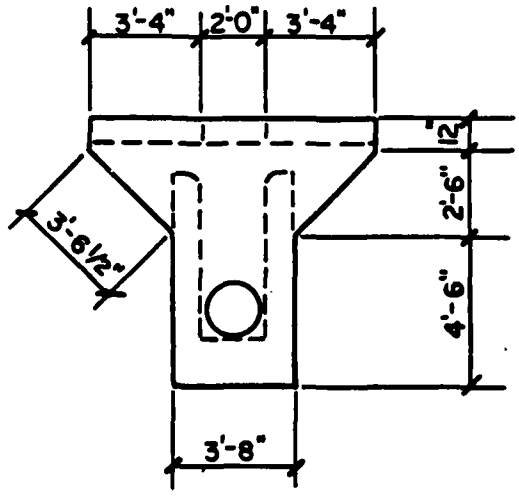


TYPICAL SECTION
EMERGENCY SPILLWAY

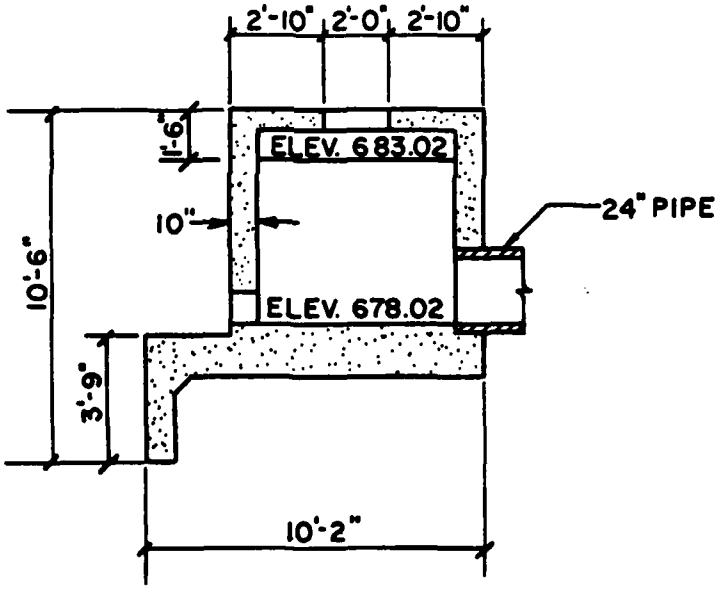
NOT TO SCALE

ELLIS DAM

PLATE B-3



UPSTREAM ELEVATION



SECTION ON ℄

DETAIL - CONCRETE RISER

NOT TO SCALE

ELLIS DAM

PLATE B-4

CURVE DATA - EMERGENCY SPILLWAY

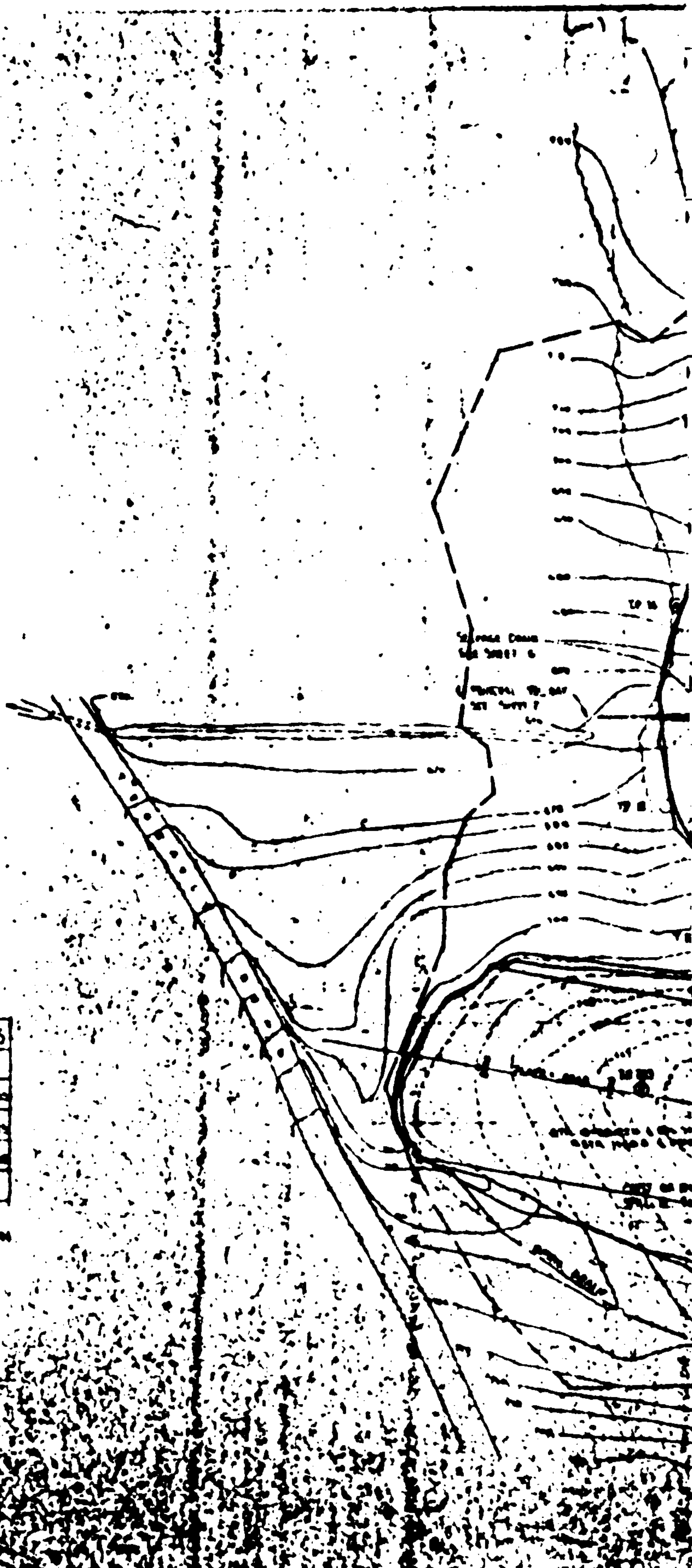
[illegible]

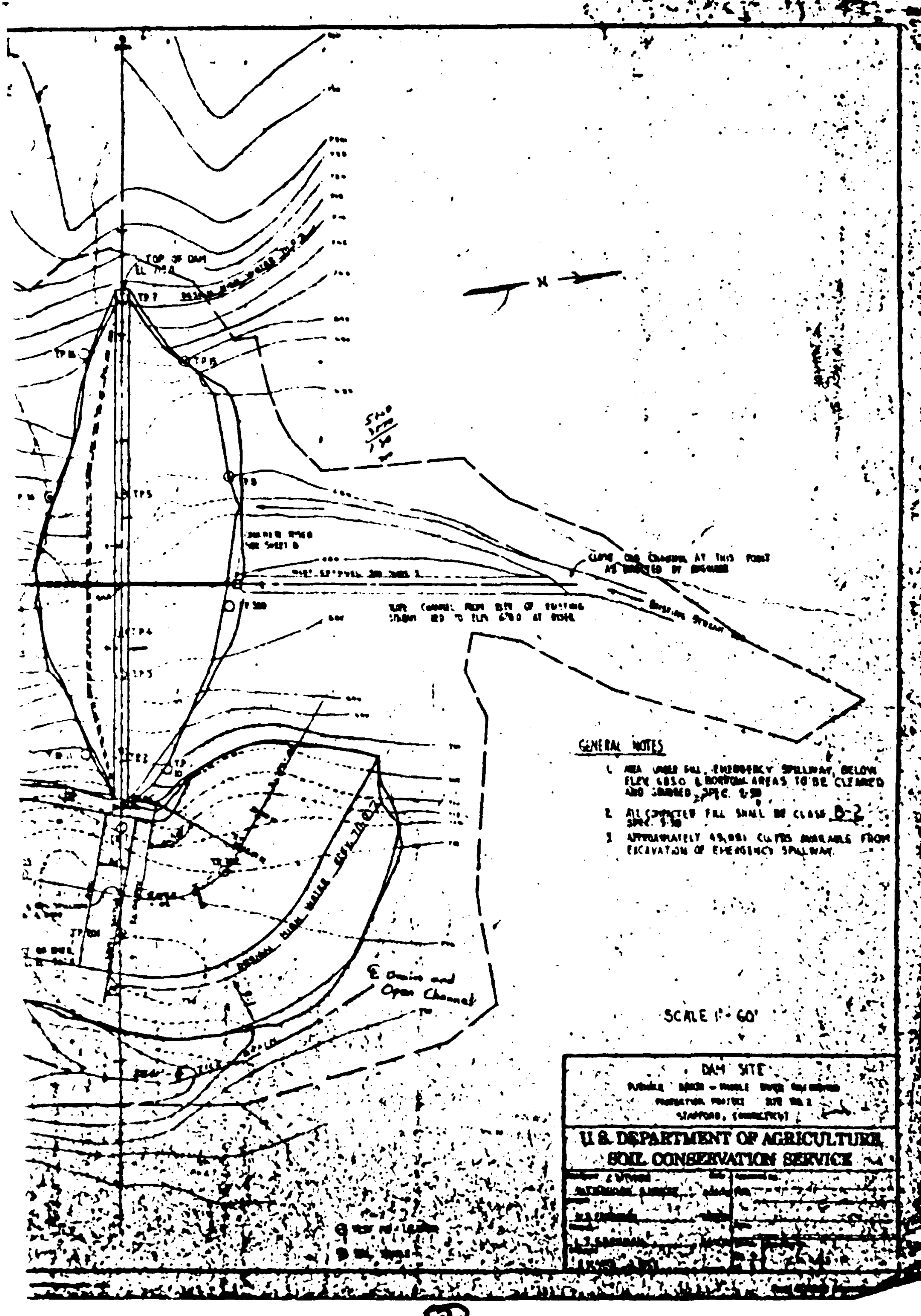
STA.	DEF. ANGLE	CHORD
PC 0+47	—	—
0+72	[illegible]	24.91'
0+97	15° 04'	24.91'
1+22	22° 56'	24.91'
+47	30° 38'	24.91'
PT. +63.07	35° 08'	16.07'

APPROXIMATE EXCAVATION QUANTITIES		
	ROCK	COMMON
INLET CHANNEL		406 CU.YDS
STRUCTURAL EXCAVATION	281 CU.YDS	4532 CU.YDS
EM. SPILLWAY *	600 CU.YDS	51,546 CU.YDS
BORROW	—	—

NOTE: THE ABOVE ITEMS ARE APPROXIMATE QUANTITIES GIVEN FOR THE INFORMATION OF THE BIDDERS. —

* INCLUDES APPROX. 7780 CU.YDS. OF STONE - 6" DIAM TO 1 CU.YD IN VOLUME WHICH WILL BE WASTED.




TOP OF DAM
N
GENERAL NOTES
SCALE 1" = 60'
DAM SITE
STAFFORD, CONNECTICUT
U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

TP-1
EL 7140

TP-3
EL 6850

TP-4 SOIL SAMPLE #4
EL. 6800

TP-7
EL.

TP-10
EL 7010

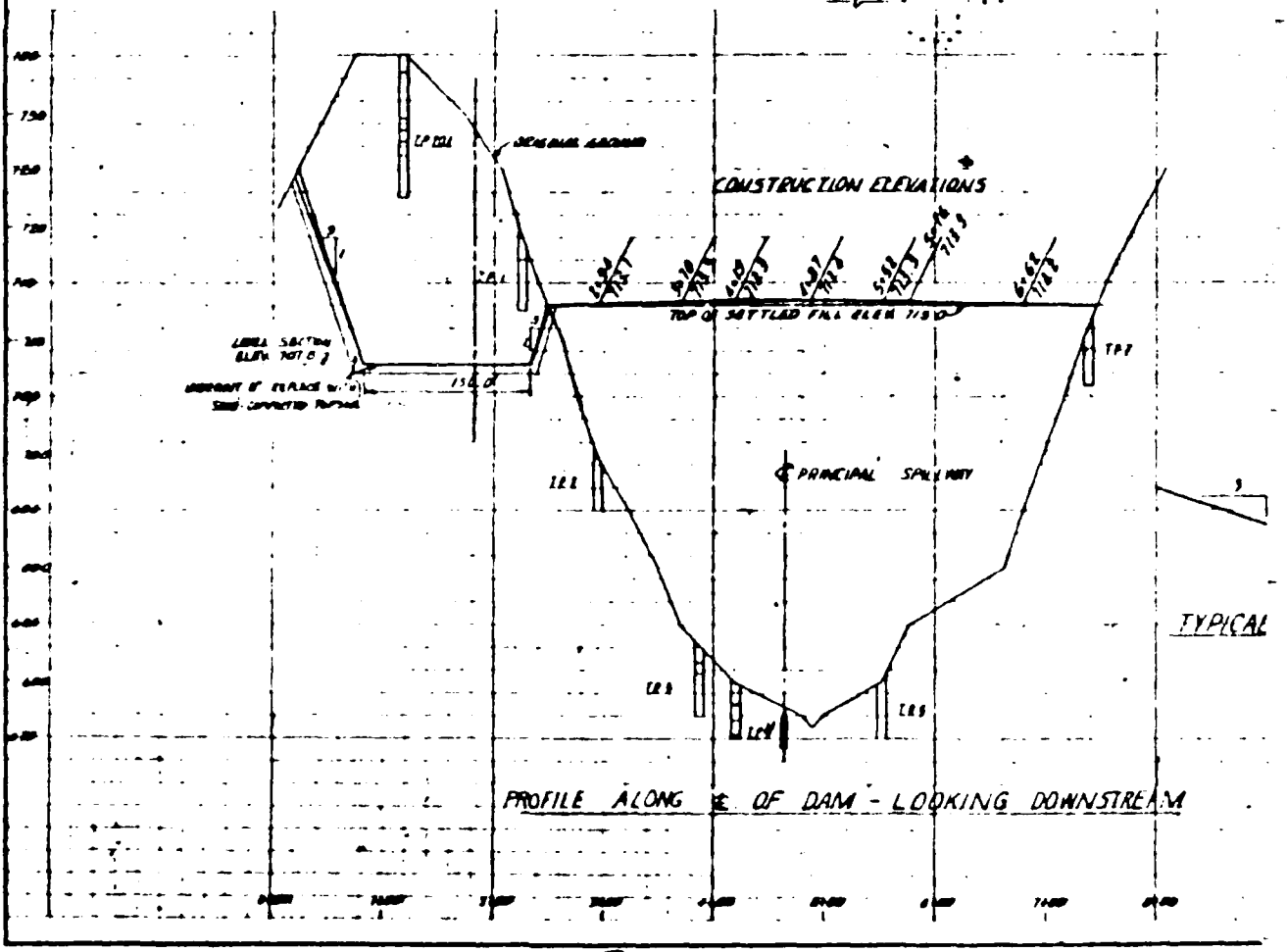
TP-15

TP-102

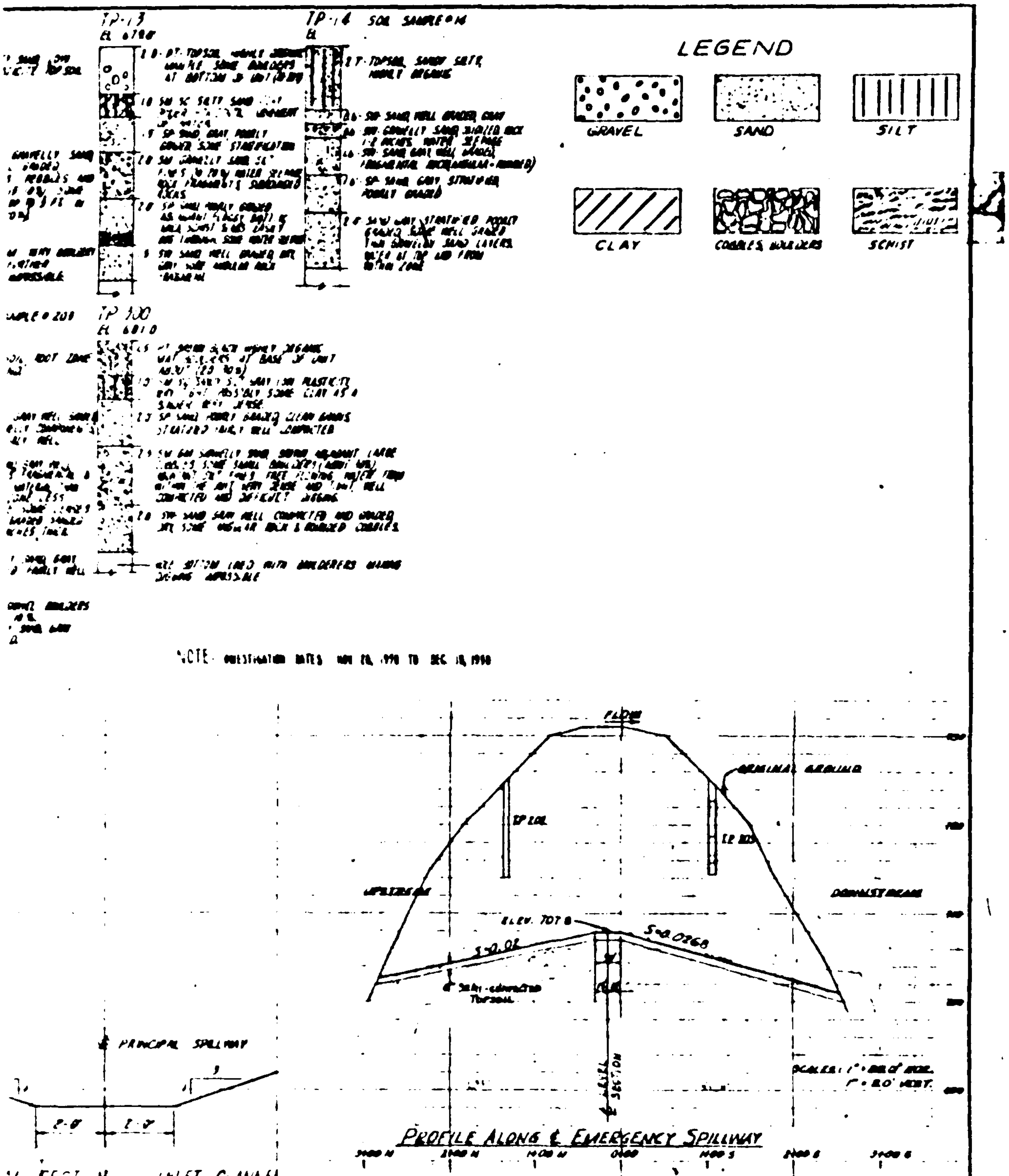
TP-201 SOIL SAMPLE #201
EL 7950

TP-202 SOIL SAMPLE #202
EL 7250

TP-203 SOIL SAMPLE
EL 7207



PROFILE ALONG ℄ OF DAM - LOOKING DOWNSTREAM



PROFILE ALONG ℄ OF DAM & SOIL INFORMATION

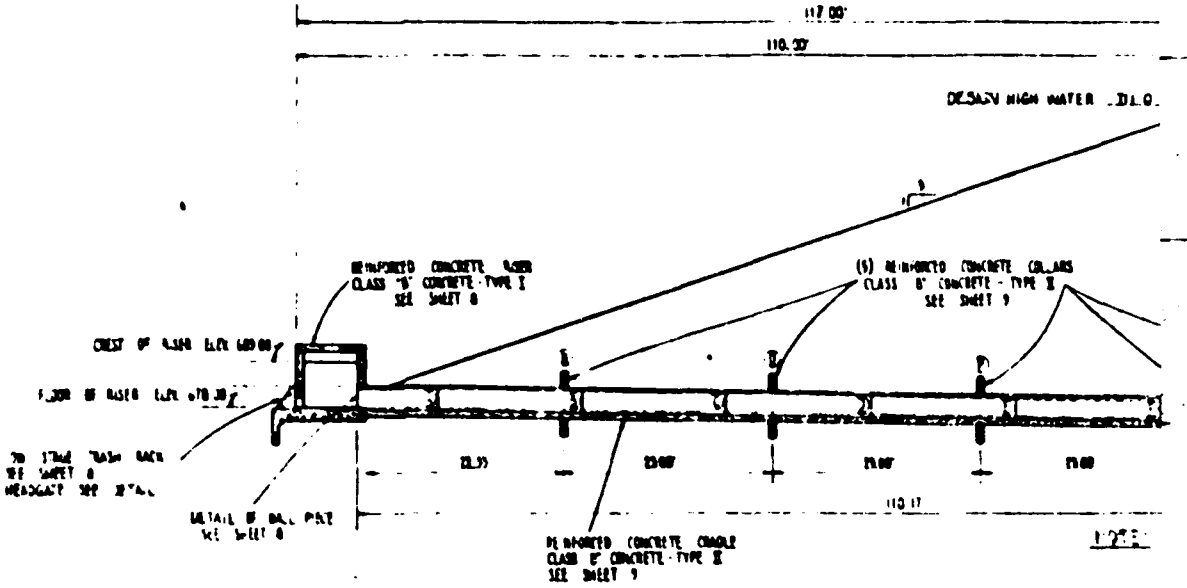
FURNACE BROOK

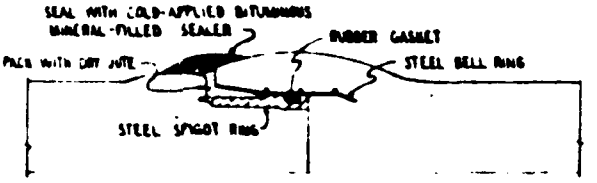
STAMFORD, CONNECTICUT

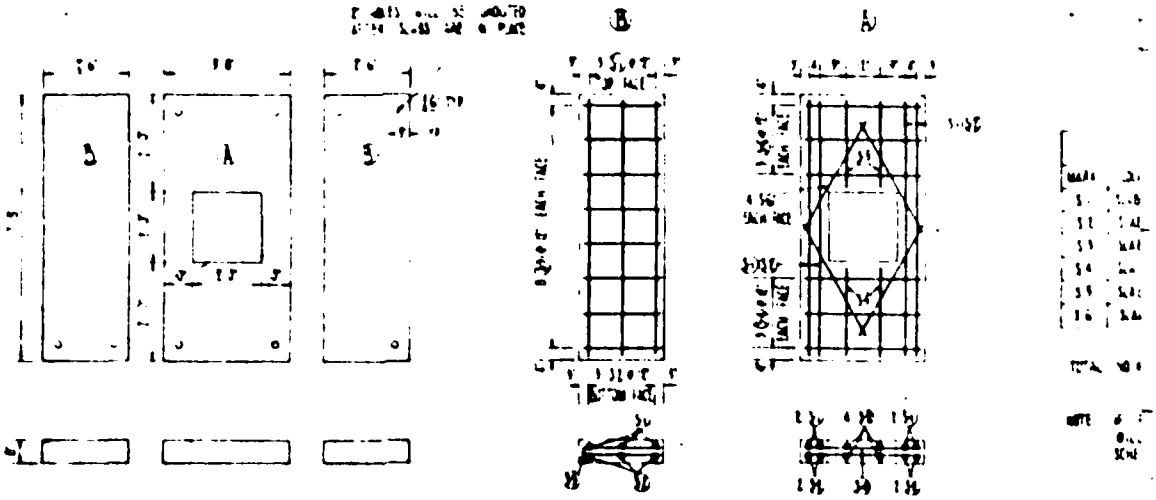
U.S. DEPARTMENT OF AGRICULTURE

SOIL CONSERVATION SERVICE

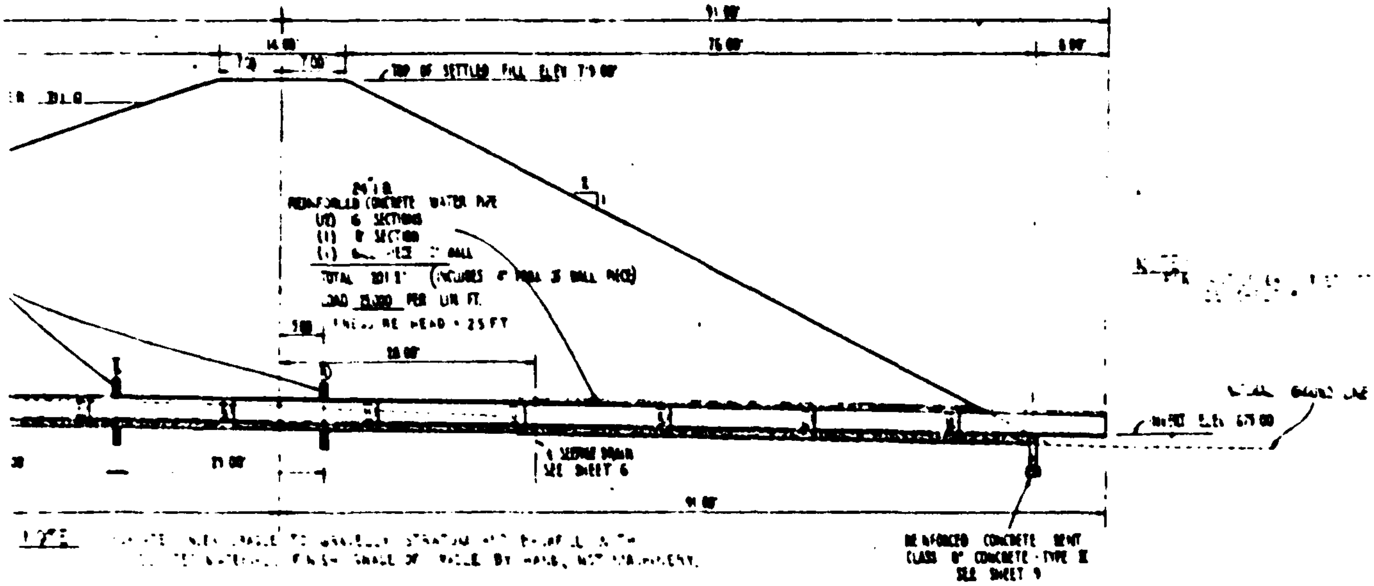
CN-409 P



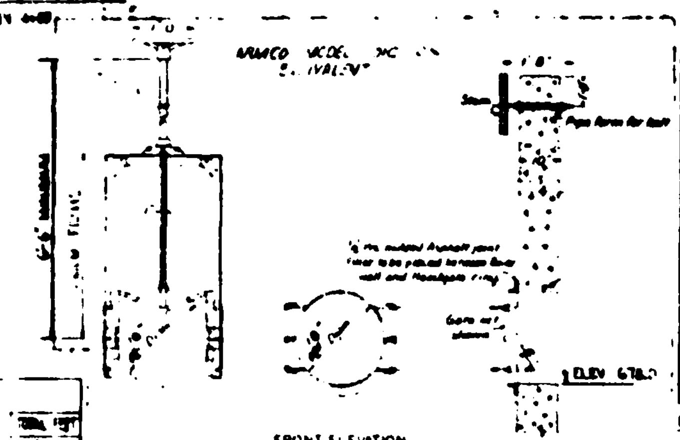




DETAIL OF REINFORCED CONCRETE ANTI-VORTEX SLAB PRECAST IN 3 SECTIONS (ALTERNATE)



PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY SCALE



SLIDE HEADGATE

FRONT ELEVATION (RING ONLY)

SECTION THRU HEADWALL

DETAIL OF HEADGATE AND HEADWALL

NOT TO SCALE

NOTE: OPERATING HEAD = 10 FT. SEAT AND SLIDE MAY BE SUPPLIED WITH FACINGS OF CAST IRON OR BRONZE. INSTALL ACCORDING TO MANUFACTURER'S RECOMMENDATIONS. EXACT LOCATION OF ANCHOR BOLTS TO BE DETERMINED ACCORDING TO TYPE OF GATE USED.

STEEL SCHEDULE

MARK	[illegible]	SIZE	BARS	LENGTH	TYPE	TOTAL FEET
[illegible]	[illegible]	4	[illegible]	[illegible]	STR	72.00
[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	STR	72.00
[illegible]	[illegible]	4	[illegible]	[illegible]	STR	64.00
[illegible]	[illegible]	4	[illegible]	[illegible]	STR	99.00
[illegible]	[illegible]	4	8	[illegible]	STR	20.30
[illegible]	[illegible]	4	8	[illegible]	STR	30.30

TOTAL [illegible] FT [illegible] LBS

NOTE: [illegible] PRECAST BARS ARE USED [illegible] SCHEDULE ON SHEET 8

AS BUILT

POINT	DISTANCE FROM DISCHARGE END OF 24" PIPE IN FEET	INVERT ELEVATION OF 24" PIPE WITH CAMBER
RISER (A)	200.99	678.00
A	192.00	677.92
[illegible]	176.00	677.77
[illegible]	160.30	677.62
[illegible]	144.00	677.46
[illegible]	128.00	677.34
[illegible]	112.00	677.16
[illegible]	96.30	677.00
[illegible]	80.00	[illegible]
[illegible]	64.00	[illegible]
[illegible]	48.30	676.30
[illegible]	32.30	[illegible]
[illegible]	16.30	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	[illegible]
[illegible]	[illegible]	676.79

NOTE: ABOVE DIMENSIONS OF LENGTH OF PIPE ARE BASED ON NOMINAL LENGTHS AND DO NOT INCLUDE CREEP

MAXIMUM CAMBER [illegible] AT POINT 6

PROFILE ALONG ℄ OF PRINCIPAL SPILLWAY
FURNACE BROOK
MIDDLE RIVER WATERSHED PROTECTION PROJECT
DETENTION RESERVOIR SITE NO. 2
STAFFORD, CONNECTICUT

U.S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE

Designed J. BITYNSKI		
Drawn B. FERGUSON G. METCER	1-58	
Traced B. GERMANN	1-58	
Checked D. MOORE A. L. BECK		Drawing No. CN-409 P

Form SCS-313 (November 19[illegible])

2

CT 478

No. _____

Inventoried By _____

Date _____

WATER RESOURCES COMMISSION
SUPERVISION OF DAMS
INVENTORY DATA

Name of Dam or Pond SCS #2 Ellis 93C

Code No. W240 MR24 ED16 PT0.5 EL0.9

Nearest Street Location TETRAULT ROAD

Town Stafford

U.S.G.S. Quad. STAFFORD SPRINGS

Name of Stream Ellis Br.

Owner Sts Comm of Agric - DEP

Address HARTFORD Ct

LAT. 41°59.5'

LONG. 72°21.9'

298.4 A

Pond Used For FLOOD CONTROL

DA 1525 A

Dimensions of Pond: Width _____ Length _____ Area ~~4~~ 56.

Total Length of Dam 665' Length of Spillway EMERG. 150'

1960

Location of Spillway ℄ OF DAM 24"ID CONC. PIPE

Height of Pond Above Stream Bed ~~40~~ 36.0'

Height of Embankment Above Spillway ~~4'~~ 2.0'

Type of Spillway Construction EMERGENCY: OVERLAND GRASS

Type of Dike Construction EARTH FILL

Downstream Conditions WEST STAFFORD

Summary of File Data Approved Maps

Remarks FLOOD WATER RETENTION CAPACITY = 566 AC F

TOTAL RESERVOIR CAPACITY 820 AC F

Class B

FORM D-4

STATE OF CONNECTICUT
WATER RESOURCES COMMISSION
Room 317, State Office Building
Hartford, Connecticut

APPLICATION FOR CONSTRUCTION PERMIT FOR DAM

Owner State of Connecticut Date May 15, 1959

P. O. Address Conn. Dept. of Agriculture
State Office Bldg., Hartford, Conn. Tel. No. Ja. 7-6341 Ext. 435

Location of Structure:

Town Stafford Shown on USGS Quadrangle Monson, Massachusetts
StaffordSprings, Conn.

Name of Stream Ellis Brook - Mt. #2 at _____ inches south of Lat. _____ north
and _____ inches east of Long. _____ west

Directions for reaching site from nearest village or route intersection:
(see sketch on reverse side)

Tetrault Road - Stafford

This is an application for: (New Construction) (Alteration) (Repair) (Removal)
(check one or more of above)

This pond is to be used for: Flood Control

Dimensions of Pond: width _____ length _____ area _____

Maximum depth of water immediately above dam: _____

Total length of dam: _____ Plans

Length of spillway: _____ See

Height of abutments above spillway: _____

Type of spillway construction: _____

Type of dike construction: _____

Spillway section will be set on: (Bedrock) (Gravel) (Clay) (Till)
(check one of above)

Remarks: _____

Signed: Joseph N. Gill, Commissioner, Dept. of Agriculture
(~~owner~~)

Name of Engineer, if any Soil Conservation Service U.S. Dept. of Agriculture

Note: Show details of construction on reverse side.

JOHN J. MOZZOCHI AND ASSOCIATES
CONSULTING ENGINEERS

JOHN J. MOZZOCHI
ASSOCIATES
OWEN J. WHITE
JOHN LUCHS, JR.

217 HEBRON AVENUE
GLASTONBURY, CONN.
PHONE MEDFORD 3-9401

May 15, 1959

William S. Wise - Director
State Water Resources Commission
State Office Building
Hartford 15, Connecticut

Re: Our File 57-73-79
Stafford Springs
Detention Reservoirs
Site No. 2 - Ellis

Dear Mr. Wise:

In accordance with your authorization dated August 28, 1958, I have reviewed the design of the referenced project by the Soil Conservation Service.

Design criteria established in letter dated April 30, 1959 from Charles J. Pelletier, Hydraulic Engineer, are tabulated herewith for comparison with actual design data.

	Design Data	Criteria
Drainage Area	1.52 S.M.	
Design Storm	15" in 6 hrs.	15" in 6 hrs.
Total Retention	1.5"	1.5"
Net Run-off	13.5"	13.5" min.
Design Peak Runoff	4985 CFS	
Per Sq. Mile	3,270 CFS	
Drawdown Time	4.92 days	0 - 5 days
Earth Spillway Discharge	1926 CFS	
Earth Spillway Width	150'	
Soil Type	Charlton Group II	
DC at Control Section	1.72'	
VC at Control Section	7.4 FPS	9 FPS Max.
Max. Velocity in Exit Channel	8.0 FPS	9 FPS Max.
Freeboard	2.0'	2.0' min.

We have checked all of the design data computations and found them substantially correct. As shown above the design meets the criteria established in

all instances.

Transmitted herewith are one (1) copy each of the design report and working drawings. The S. C. S. will deliver three (3) sets of corrected documents as soon as they can be re-printed.

I recommend that a construction permit be issued for this project.

Very truly yours,

John J. Mozzochi
Consulting Engineer

JJM:hk
encls.

STATE OF CONNECTICUT
WATER RESOURCES COMMISSION
Room 317, State Office Building
Hartford, Connecticut

Date: May 22, 1959

TO: State of Connecticut
Department of Agriculture
State Office Building
Hartford, Connecticut ATTENTION: MR. JOSEPH N. GILL, COMMISSIONER

Gentlemen:

Your application for Construction Permit dated May 15, 1959, for the construction of an earth dam on Ellis Brook in the Town of Stafford in accordance with plans and specifications marked CT-403 and prepared by the Soil Conservation Service, U. S. Department of Agriculture,

copy of which is attached hereto, has been considered and the construction described therein is hereby approved only under the following conditions:

1. The Commission shall be notified

   A) When construction is started
   B) When foundation is excavated
   C) When the dam is completed and before water is impounded
   D) When project is completed and ready for final inspection

2. _____

3. _____

4. _____

5. _____

This permit, with the attached application form ~~and other documents~~ must be kept at the site of the work and made available to the Commission at any time during the construction. This permit covers the construction as described in ~~the accepted documents~~ documents submitted. If any changes are contemplated the Commission must be notified and supplementary approval obtained.

continued

If the construction authorized by this construction permit is not started within TWO YEARS of the date of this permit and completed within FOUR YEARS of the same date this permit must be renewed.

Your attention is directed to Section 25-115 of the 1958 Revision to the General Statutes - Liability of owner or operator. Nothing in this chapter, and no order, approval or advice of the commission or a member thereof, shall relieve any owner or opertor of such a structure from his legal duties, obligations and liabilities resulting from such ownership or operation. No action for damages sustained through the partial or total failure of any structure or its maintenance shall be brought or maintained against the state, a member of the commission or the commission, or its employees or agents, by reason of supervision of such structure exercised by the commission under this chapter.

The Commission cannot convey or waive any property right in any lands of the state, nor is this permit to be construed as giving any property rights in real estate or material or any exclusive privileges, nor does it authorize any injury to private property or the invasion of private rights or any infringement of federal, state or local laws or regulations.

Your attention is also directed to Section 26-134 of the 1958 Revision to the General Statutes - Obstructing streams. No person shall, unless authorized by the director, prevent the passing of fish in any stream or through the outlet or inlet of any pond or stream by means of any rack, screen, weir or other obstruction or fail, within ten days after service upon him of a copy of an order issued by the director, to remove such obstruct. - - - - -The address of the State Board of Fisheries and Game is 2 Wethersfield Avenue, Hartford 15, Connecticut.

Very truly yours,

By:_____
William S. Wise
Director

WSW/jt

Encl.

cc: Town Clerk, Stafford

Mr. Sam Smith, Soil Conservation Service

Mr. John J. Mazzochi

FORM D-7

STATE OF CONNECTICUT
WATER RESOURCES COMMISSION
Room 317, State Office Building
Hartford, Connecticut

CERTIFICATE OF APPROVAL

Date November 9, 1961

To: State of Connecticut

Department of Agriculture and Natural Resources
State Office Building
Hartford, Connecticut

ATTENTION: MR. JOSEPH N. GILL, COMMISSIONER

NAME OF STRUCTURE: Ellis Brook Dam, Site #2

This is to certify that the following construction work:

construction of an earth dam in accordance with the plans and specifications marked CT-403 and prepared by the Soil Conservation Service, U. S. Department of Agriculture

on your property on Ellis Brook

in the Town (s) of Stafford

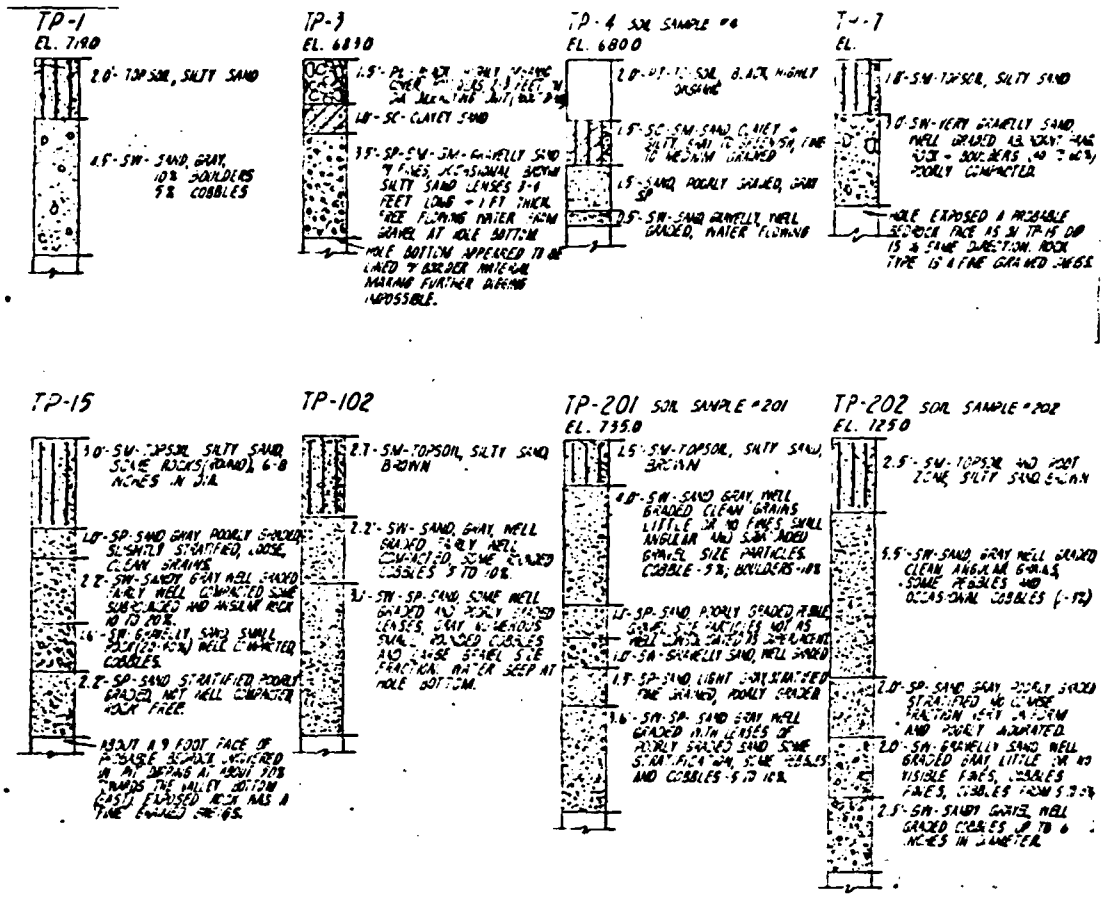
for which construction permit was issued May 22, 1959, has been completed to the satisfaction of this Commission and that such structure is approved as of date of this Certificate.

cc: Soil Conservation Service

WATER RESOURCES COMMISSION

BY: William S. Wise
William S. Wise, Director

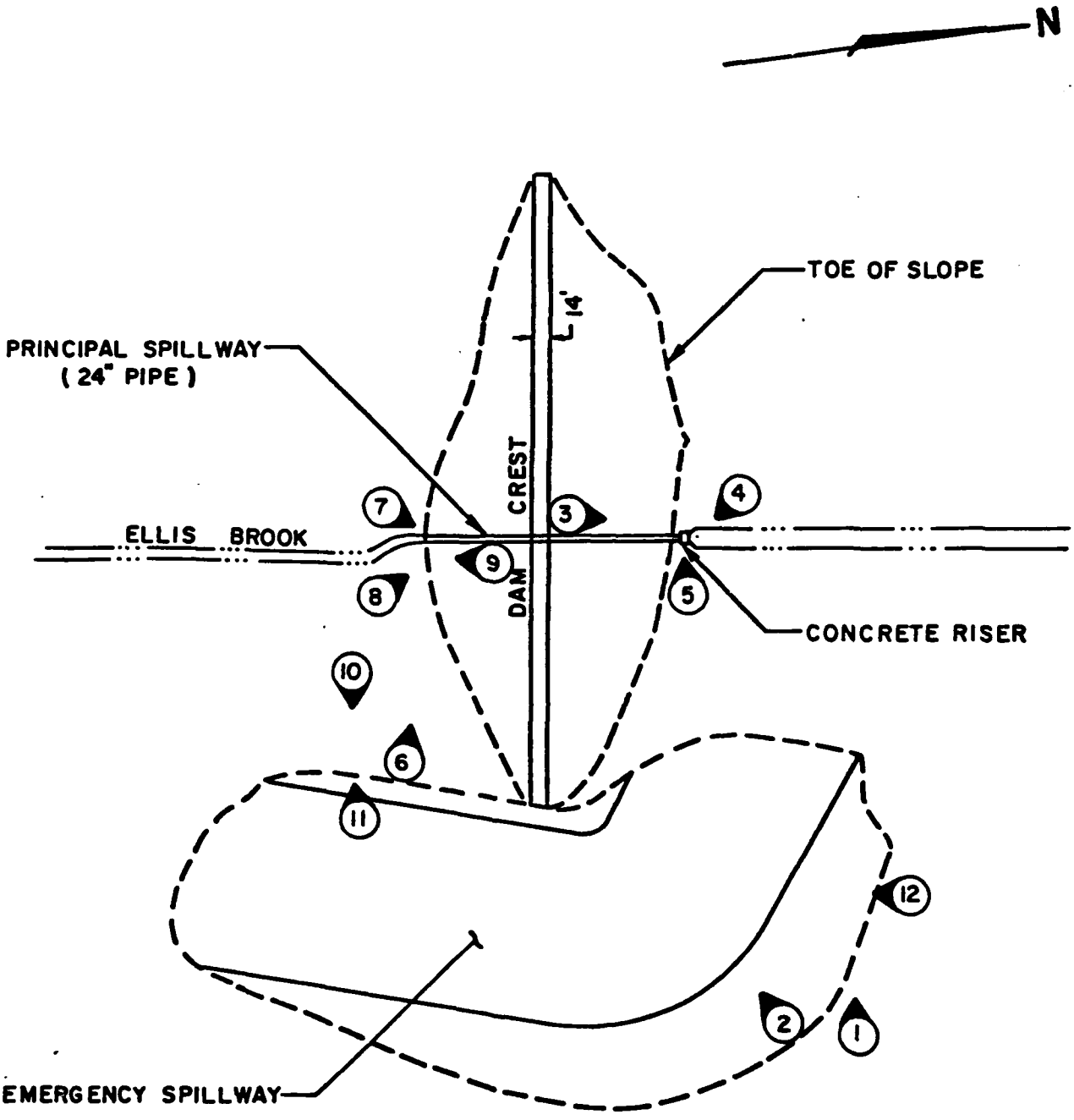
Note: The owner is required by law to record this Certificate in the land records of the town or towns in which the dam, dike or similar structure is located.



NOTE: INVESTIGATION DATES: NOV. 26, 1958 TO DEC. 18, 1958

APPENDIX C

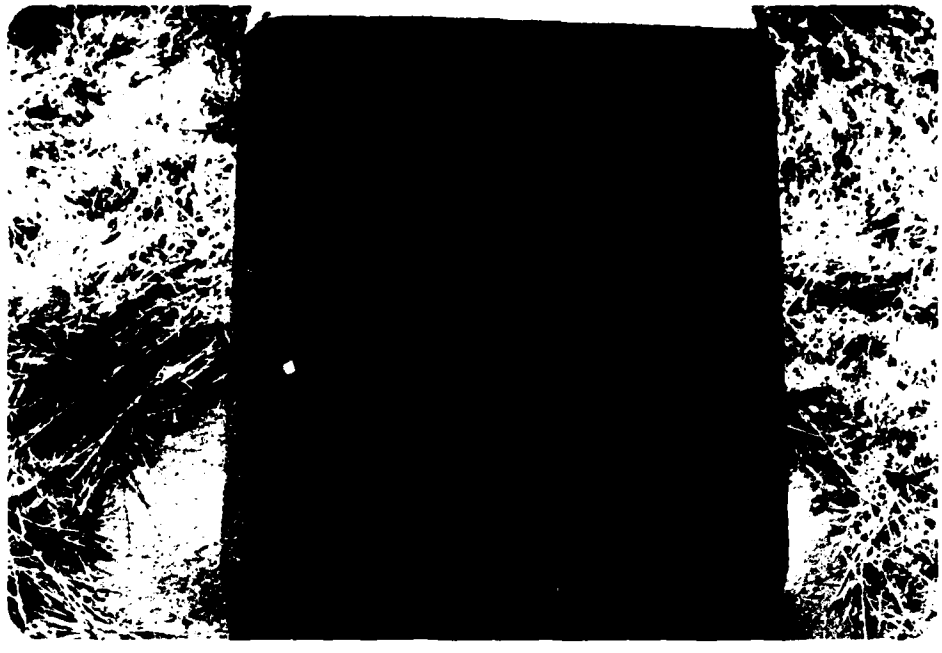
PHOTOGRAPHS



GENERAL PLAN

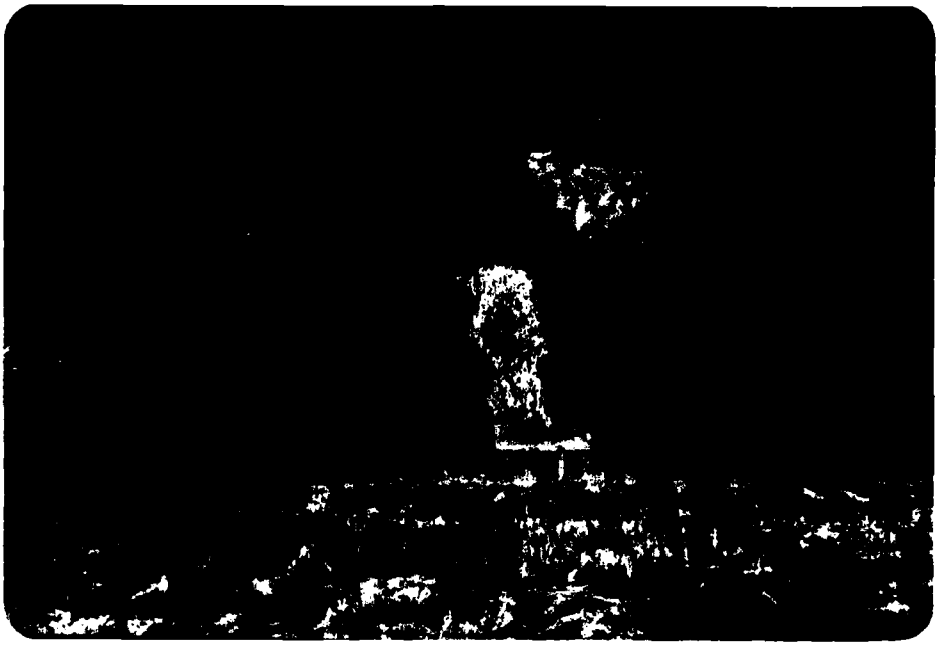
SCALE: 1"=120'±

PHOTO INDEX
ELLIS DAM

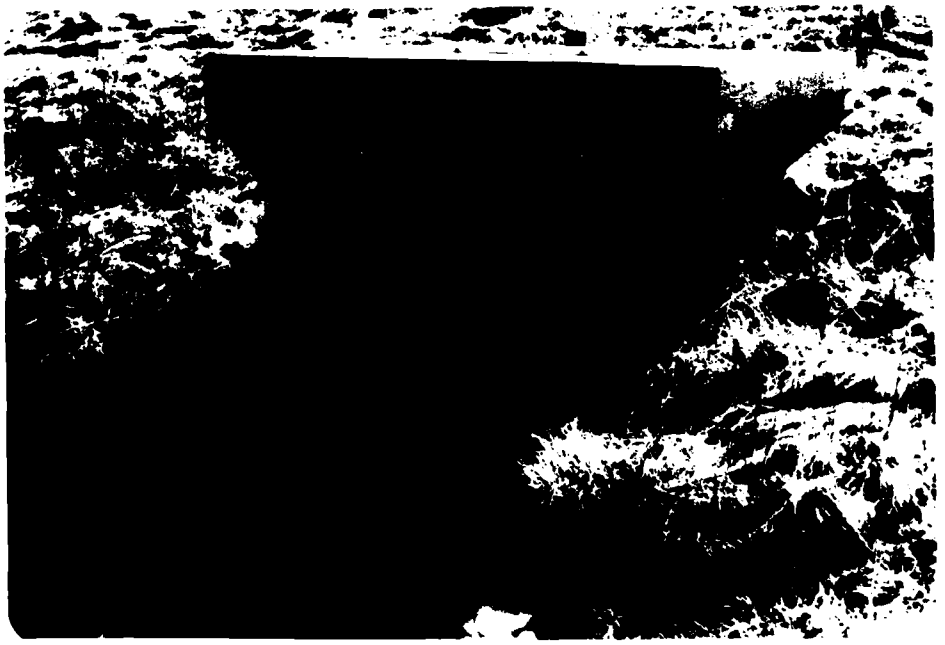


C-1 IDENTIFYING MONUMENT

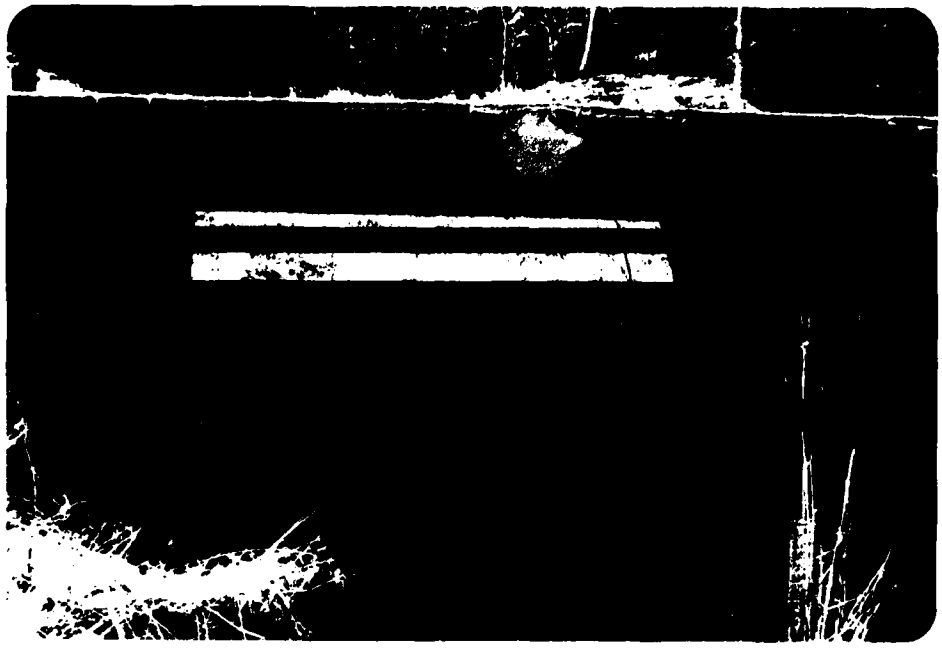
C-2 UPSTREAM SLOPE



C-3 UPSTREAM APPROACH CHANNEL



C-4 PRINCIPAL SPILLWAY INLET STRUCTURE



C-5 PRINCIPAL SPILLWAY INLET WEIR

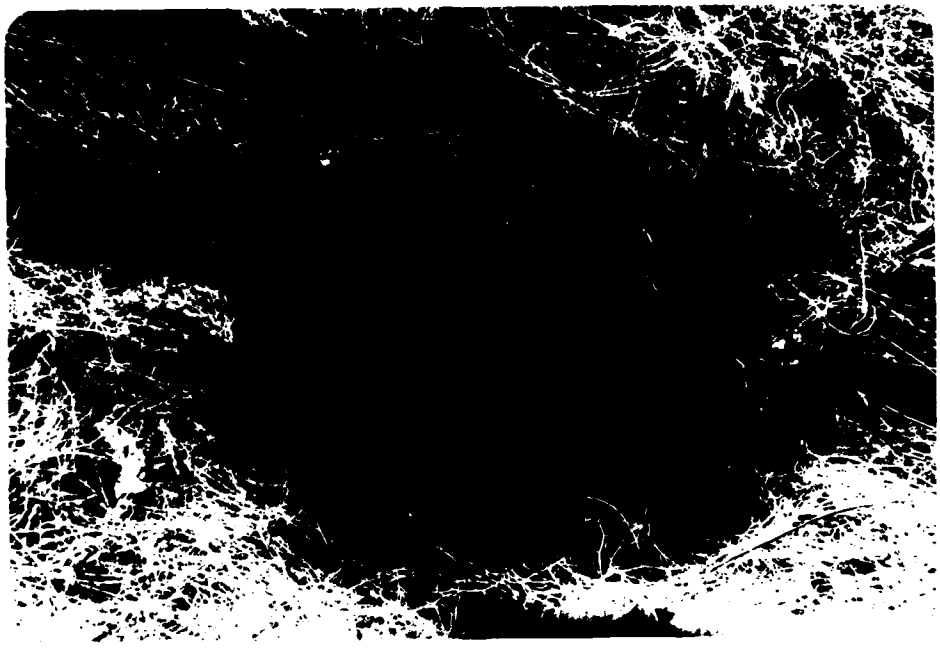
C-6 DOWNSTREAM SLOPE

C-7 PRINCIPAL SPILLWAY OUTLET

C-8 FOUNDATION DRAIN OUTLET

C-9 ELLIS BROOK DOWNSTREAM OF DAM

C-10 SETTLEMENT AREA DOWNSTREAM SLOPE

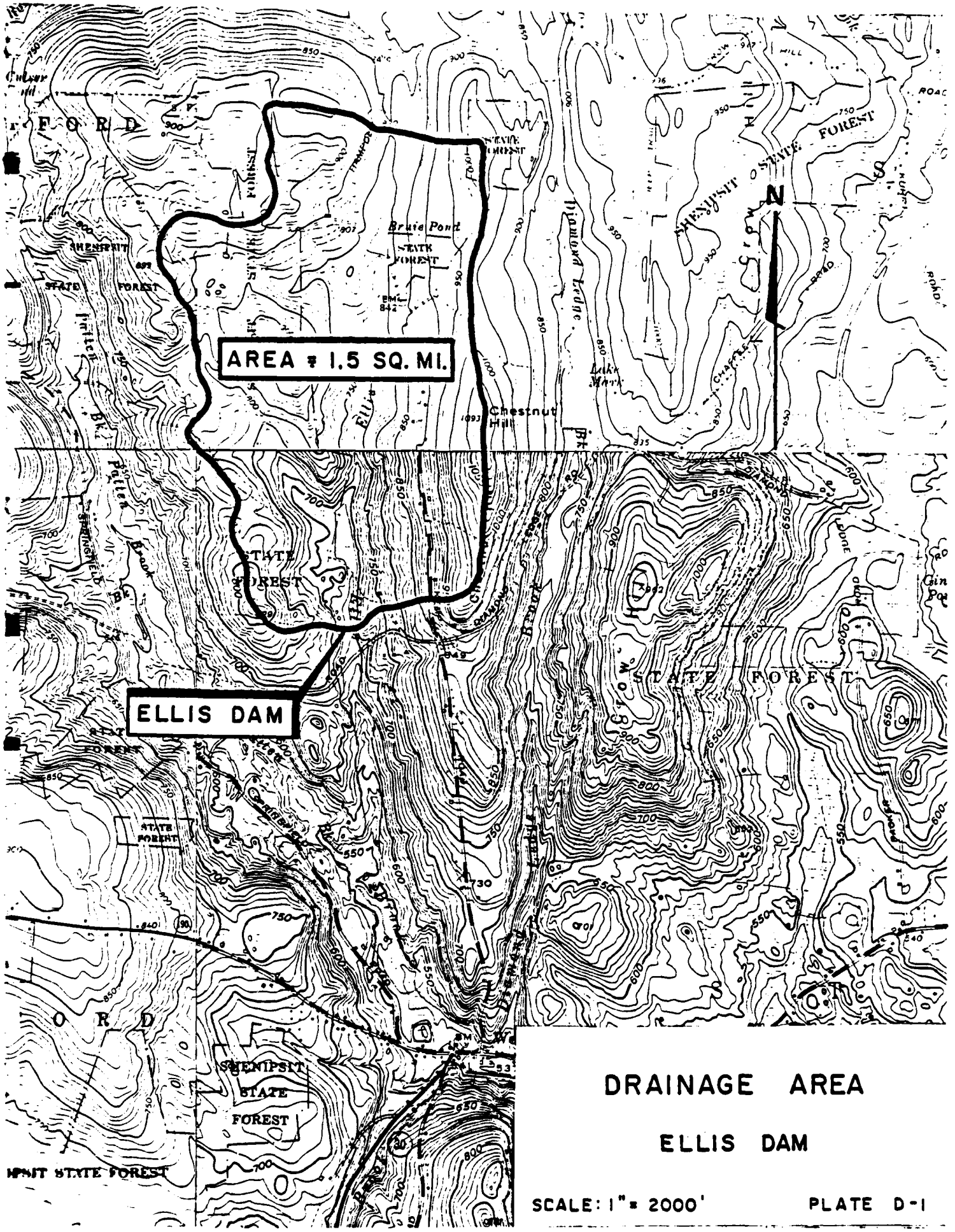


C-11 SETTLEMENT AREA TOP OF SLOPE

C-12 EMERGENCY SPILLWAY

APPENDIX D

HYDROLOGIC AND HYDRAULIC COMPUTATIONS

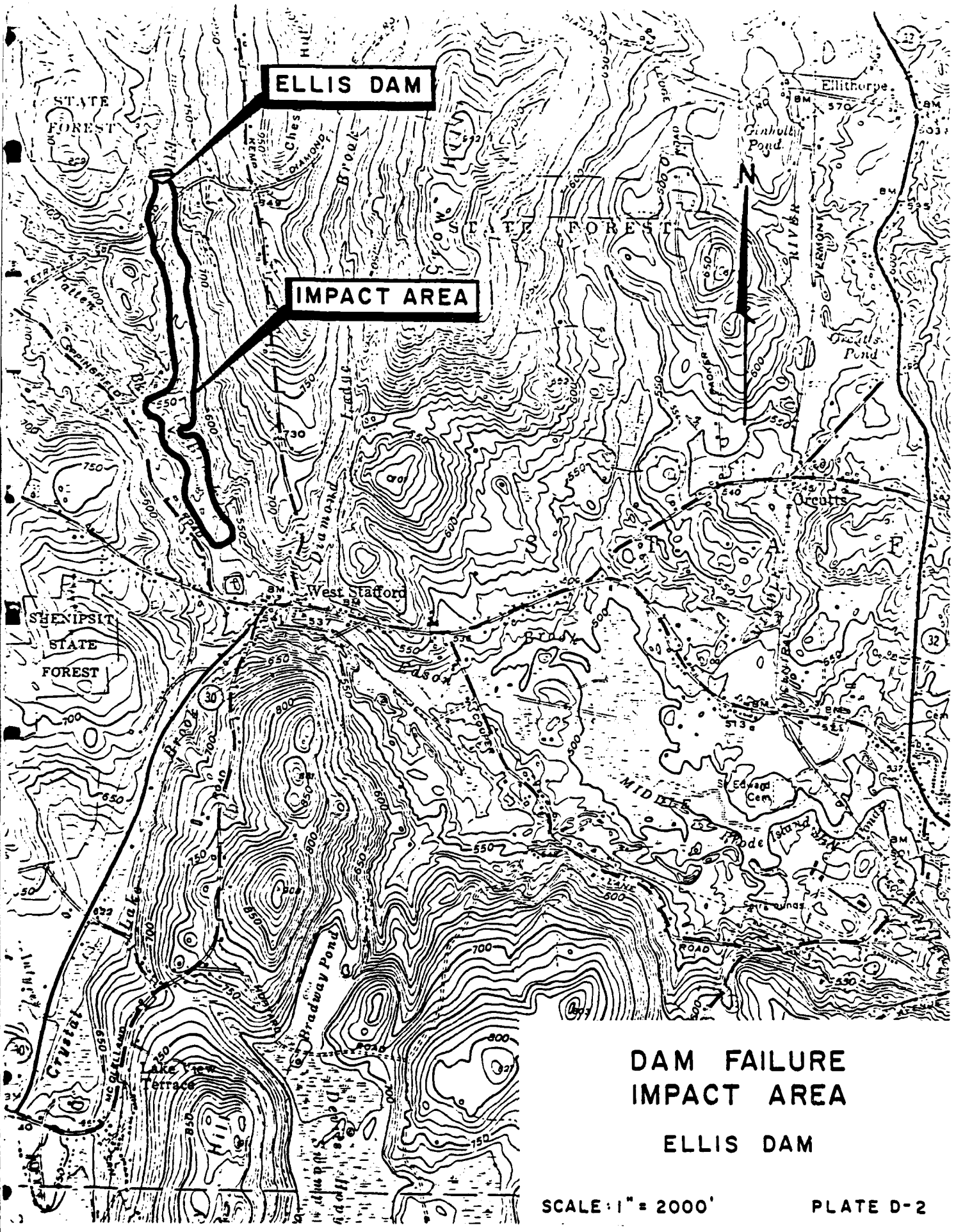


DRAINAGE AREA

ELLIS DAM

SCALE: 1" = 2000'

PLATE D-1

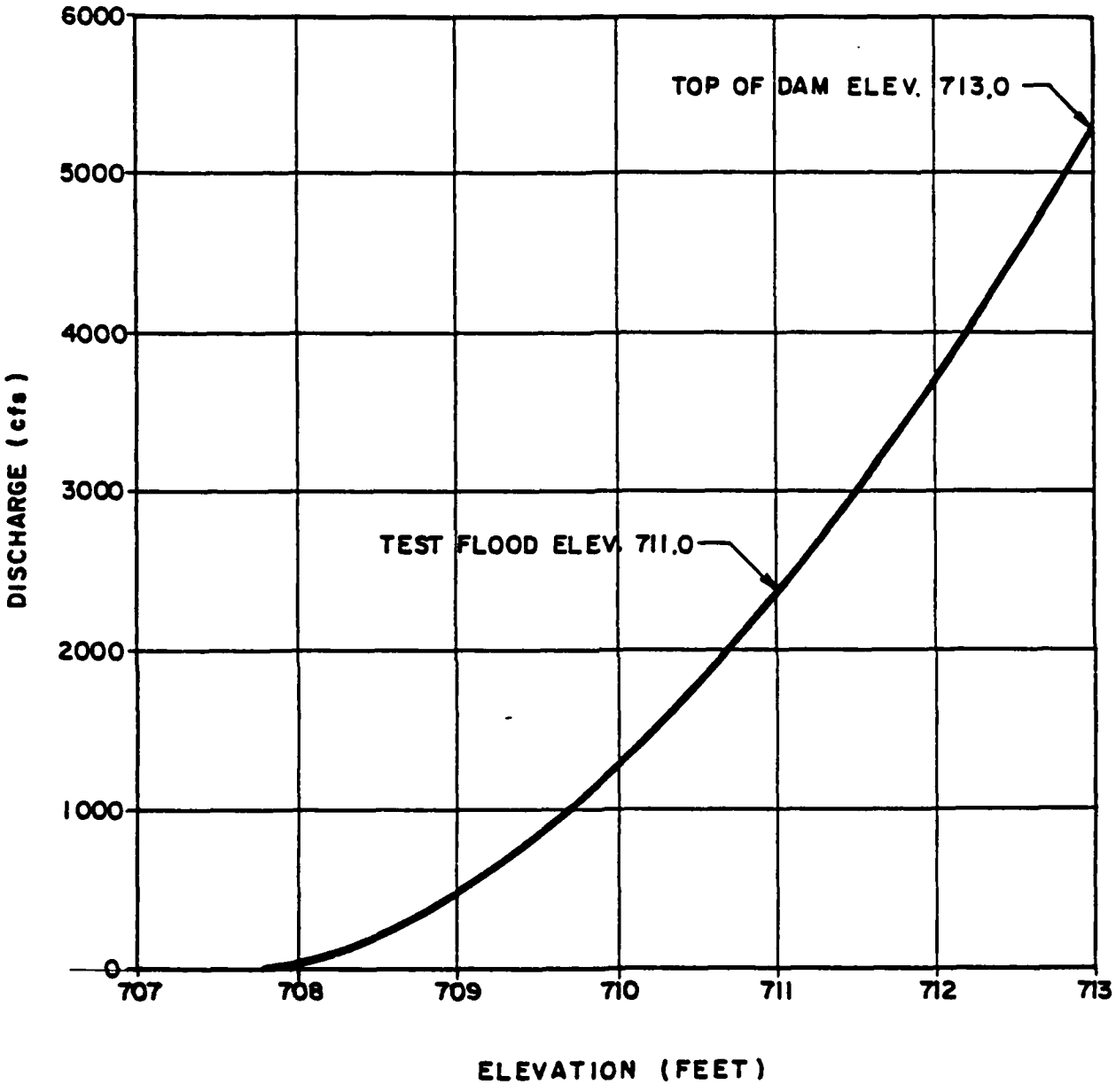


DAM FAILURE IMPACT AREA

ELLIS DAM

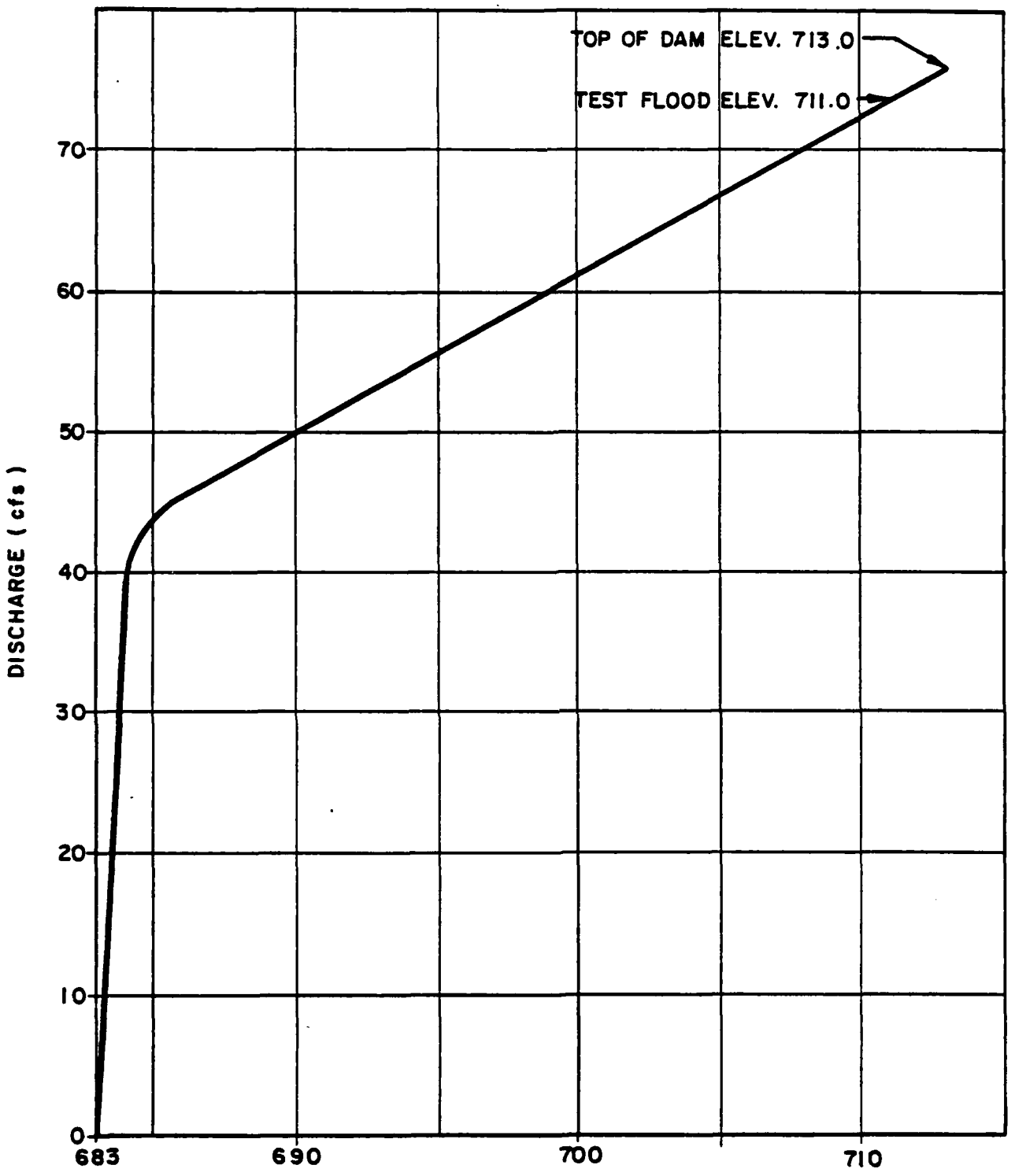
SCALE: 1" = 2000'

PLATE D-2



ELLIS DAM
RATING CURVE
EMERGENCY SPILLWAY

PLATE D-3



ELLIS DAM
RATING CURVE
PRINCIPAL SPILLWAY

PLATE D-4

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO.
GJM	7/15/81			80-157

SUBJECT: Test Flood - Ellis Dam

SHEET NO. 1 of 1

Watershed - Rolling Terrain

Drainage Area = 1.5 Sq. Mi.

Per C. of E. Chart P.M.F. = 2300 CSM

Peak Flow = 1.5 x 2300 = 3450 cfs

Peak Flow as Calculated by S.C.S. = 4985 cfs

TEST FLOOD = 4985 cfs

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO.
GJM	3/9/91			80-157

SUBJECT: Dam Failure Hydrograph - Ellis Dam

SHEET NO. 1 of 8

STAGE - DISCHARGE RATINGS

STA. 0+0 = ℄ DAM

STATION	SLOPE	n	ELEV.	AREA	P	Q
1+0	2.0%	.040	685	2150	320	40,600
			690	3970	420	94,100
			695	6140	470	206,400
5+0	2.0%	.125	680	3550	410	25,400
			685	5750	490	50,500
			690	8320	560	85,500
10+0	2.0%	.125	675	4550	440	36,700
			680	7070	580	63,700
			685	10040	620	109,200
20+0	5.3%	.125	620	1320	200	12,900
			625	2530	300	29,000
			630	4270	400	57,300
30+0	2.0%	.125	595	1000	250	4,300
			600	2500	350	15,800
			605	4440	420	36,300
			610	6720	490	65,500
40+0	3.3%	.125	555	800	280	2,500
			560	2900	580	18,600
			565	5900	650	56,900
50+0	0.6%	.040	545	330	110	2,000
			550	1120	215	9,800
			555	3940	615	39,400
55+0	0.6%	.040	540	440	220	2,000
			545	1720	310	15,300
			550	3470	416	41,800

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO.
GJM	3/10/81			80-157

SUBJECT: Dam Failure Hydrograph - Ellis Dam

SHEET NO. 2 of 3

STATION	SLOPE	n	ELEV.	AREA	P	Q
60+0	0.6%	.035	535	80	40	400
			540	450	130	3,400
			545	2490	440	26,300
65+0	0.6%	.035	535	550	220	3,400
			540	2200	440	21,400
70+0	0.4%	.035	530	160	160	400
			535	1610	420	10,700
			540	4360	690	40,400

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO.
GJM	3/8/81			80-157

SUBJECT: Dam Failure Hydrograph – Ellis Dam

SHEET NO. 3 of 8

Storage = S = 565 Ac. Ft. at Test Flood Peak

Test Flood Pool Elev. = 711.0

Streambed Elev. at STA. 1+0 = 673.0 (℄ Dam = 0+0)

Dam Length at Mid Height = 360'

Use Breach width = 140' = W_b

Max. Height = 38' = Y_o

$$Q_{P1} = 8/27\, W_b \sqrt{g}\, Y_o^{3/2} = 8/27 \times 140 \sqrt{g} \times 38^{3/2}$$

$$= 55{,}100 \text{ cfs}$$

STA. 1+0

Stage = 686.4
Area = 2640 S.F
Vol. = 6 Ac. Ft.

$$Q_{P2\ Trial} = Q_{P1}\left(1 - \frac{V_1}{S}\right) = 55{,}100\left(1 - \frac{6}{565}\right) = 54{,}500 \text{ cfs}$$

Stage: 686.3
Area: 2620 S.F
Vol: 6 Ac. Ft.

$$Q_{P2} = 55{,}100\left(1 - \frac{6}{565}\right) = 54{,}500$$

Stage = 686.3

Depth: 13.3'

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO.
GJM	3/8/91			80-157

SUBJECT: Dam Failure Hydrograph - Ellis Dam

SHEET NO. 4 of 8

STA. 5+0

Q_{P2} = 54,500 cfs
Streambed Elev. = 663
S = 565 Ac.-Ft.

Stage = 685.6
Area = 6040
Vol. = 55 Ac.Ft.

Q_{P3} Trial = $54{,}500\left(1-\frac{55}{565}\right)$ = 49,200 cfs

Stage = 684.7
Area = 5630 S.F.
Vol. = 52 Ac.Ft.

$Q_{P3} = 54{,}500\left(1-\frac{54}{565}\right) = 49{,}300$ cfs

Stage = 684.8

Depth = 21.8'

STA. 10+0

Q_{P3} = 49,300 cfs
Streambed Elev = 654
S = 565 Ac.Ft.

Stage = 677.4
Area = 5740 S.F.
Vol = 66 Ac.Ft.

Q_{P4} Trial = $49{,}300\left(1-\frac{60}{565}\right)$ = 43500 cfs

Stage = 676.3
Area = 5180 S.F.
Vol. = 60 Ac.Ft.

$Q_{P4} = 49{,}300\left(1-\frac{63}{565}\right) = 43{,}800$ cfs

Stage = 676.3

Depth = 22.3

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO.
GJM	3/10/81			80-157

SUBJECT: Dam Failure Hydrograph - Ellis Dam

SHEET NO. 5 of 8

STA. 20+0

$Q_{P4} = 43,800$ cfs
Streambed Elev. = 609
S = 565 Ac.-Ft.

Stage = 627.6
Area = 3440 S.F.
Vol. = 79 Ac.Ft.

Q_{P5} Trial: $43,800\left(1-\frac{79}{565}\right) = 37,700$ cfs

Stage = 626.5
Area = 3060 S.F.
Vol. = 70 Ac.Ft.

$Q_{P5} = 43,800\left(1-\frac{74}{565}\right) = 38,400$ cfs

Stage = 626.7

Depth = 17.7'

STA. 30+0

$Q_{P5} = 38,400$ cfs
Streambed Elev = 589
S = 565 Ac.Ft.

Stage = 605.4
Area = 4600 S.F.
Vol = 106 Ac.Ft.

Q_{P6} Trial: $38,400\left(1-\frac{106}{565}\right) = 31,200$ cfs

Stage = 603.8
Area = 3960 S.F.
Vol. = 91 Ac.Ft.

$Q_{P6} = 38,400\left(1-\frac{99}{565}\right) = 31,720$ cfs

Stage = 603.9

Depth = 14.9'

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO.
GJM	3/10/81			80-157

SUBJECT: Dam Failure Hydrograph - Ellis Dam

SHEET NO. 6 of 8

STA. 40+01

$Q_{p6} = 31,700$ cfs
Streambed Elev. = 549
S = 565 Ac. Ft.

Stage = 561.7
Area = 3930 S.F.
Vol. = 90 Ac. Ft.

Q_{p7} Trial $= 31,700 \left(1 - \frac{90}{565}\right) = 26,700$ cfs

Stage = 561.1
Area = 3530 S.F.
Vol. = 81 Ac. Ft.

$Q_{p7} = 31,700 \left(1 - \frac{85}{565}\right) = 26,900$ cfs

Stage = 561.1

Depth = 12.1'

STA. 50+00

$Q_{p7} = 26,900$ cfs
Streambed Elev = 539
S = 565 Ac. Ft.

Stage = 552.9
Area = 2750 S.F.
Vol = 63 Ac. Ft.

Q_{p8} Trial $= 26,900 \left(1 - \frac{63}{565}\right) = 23,900$ cfs

Stage = 552.4
Area = 2460 S.F.
Vol. = 57 Ac. Ft.

$Q_{p8} = 26,900 \left(1 - \frac{60}{565}\right) = 24,000$ cfs

Stage = 552.4

Depth = 13.4'

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO.
GJM	3/10/81			80-157

SUBJECT: Dam Failure Hydrograph - Ellis Dam

SHEET NO. 7 of 8

STA. 55+0

$Q_{p8} = 24,000$ cfs
Streambed Elev. = 536
S = 565 Ac.-Ft

Stage = 546.6
Area = 2280 S.F.
Vol. = 26 Ac. Ft.

Q_{pq} Trial $= 24,000\left(1-\frac{26}{565}\right) = 22,900$ cfs

Stage = 546.4
Area = 2210 S.F.
Vol. = 25 Ac. Ft.

$Q_{pq} = 24,000\left(1-\frac{25}{565}\right) = 22,900$ cfs

Stage = 546.4

Depth = 10.4'

STA. 60+0

$Q_{pq} = 22,900$ cfs
Streambed Elev. = 533
S = 565 Ac. Ft

Stage = 544.2
Area = 2190 S.F.
Vol = 25 Ac. Ft.

Q_{p10} Trial $= 22,900\left(1-\frac{25}{565}\right) = 21,900$ cfs

Stage = 544.3
Area = 2190 S.F.
Vol. = 25 Ac. Ft.

$Q_{p10} = 22,900\left(1-\frac{25}{565}\right) = 21,900$ cfs

Stage = 544.3

Depth = 11.3'

FUSS&O'NEILL consulting engineers

PREPARED BY	DATE	CHECKED BY	DATE	PROJECT NO.
GJM	3/10/81			80-157

SUBJECT: Dam Failure Hydrographs

SHEET NO. 8 of 8

STA. 65+0

$Q_{P10} = 21,900$ cfs
Streambed Elev. = 530
S = 565 Ac.-Ft.

Stage = 540.0
Area = 2200 S.F.
Vol. = 25 Ac.Ft.

Q_{P11} Trial $= 21,900\left(1-\frac{25}{565}\right) = 20,900$ cfs

Stage = 539.9
Area = 2150 S.F.
Vol. = 25 Ac.Ft.

$Q_{P11} = 21,900\left(1-\frac{25}{565}\right) = 20,900$ cfs

Stage = 539.9

Depth = 9.9'

STA. 70+0

$Q_{P11} = 20,900$ cfs
Streambed Elev. = 528
S = 565 Ac.-Ft.

Stage = 536.7
Area = 2550 S.F.
Vol = 29 Ac.Ft.

Q_{P12} Trial $= 20,900\left(1-\frac{29}{565}\right) = 19,800$ cfs

Stage = 536.5
Area = 2450 S.F.
Vol. = 28 Ac.Ft.

$Q_{P12} = 20,900\left(1-\frac{28}{565}\right) = 19,900$ cfs

Stage = 536.5

Depth = 8.5'

APPENDIX E

INFORMATION AS CONTAINED IN

THE NATIONAL INVENTORY OF DAMS